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ABSTRACT

Rapid changes in the nation's economy have resulted in significant increases in the demand for workers in technical jobs but a significant decrease in the demand for unskilled workers. Unfortunately, the abilities of available manpower have not been developed to meet the requirements of jobs at the levels where the increased demands have occurred. As a result, employment opportunities are not available for many individuals although many jobs cannot be filled. This handbook was developed to provide a basic guide for use in restructuring job systems in order to utilize available manpower resources more efficiently. The proper and judicious application of the job restructuring techniques described in this handbook may contribute to alleviating this imbalance by providing appropriate job opportunities for these individuals. The methodology contained in this handbook was derived from a special adaptation of the job analysis concepts and techniques developed by the United States Training and Employment Service over a 35-year period. Job restructuring worksheets and a bibliography are included in the report. (Author/BC)

a handbook for job restructuring

U.S. DEPARTMENT OF LABOR
Manpower Administration
1970

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Foreword

This handbook has been developed to provide a basic guide for use in restructuring job systems in order to utilize available manpower resources more efficiently. Rapid changes in the Nation's economy have resulted in significant increases in the demand for workers in technical jobs and, at the same time, significant decreases in the demand for unskilled workers. This shift in manpower requirements is expected to continue in the years ahead.

Unfortunately, the abilities of available manpower have not been developed to meet the requirements of jobs at the levels where the increased demands have occurred. As a result, employment opportunities are not available for many individuals while many jobs cannot be filled. The proper and judicious application of the job restructuring techniques described in this handbook may contribute to alleviating this imbalance by providing appropriate job opportunities for these individuals, together with lattices and pathways for career development.

The methodology described in this handbook is a product of the continuing research on occupational data collection, evaluation, and presentation carried on by the U.S. Training and Employment Service under Robert J. Brown, Acting Deputy Associate Manpower Administrator. The worker functions and traits upon which this methodology is based are described in detail. This handbook presents primarily a methodology and does not deal with problems involving personnel practices, union relations, plant policies, and similar matters.

Malcolm R. Lovell, Jr.
Manpower Administrator

Preface

This handbook was drafted by the following staff members from four of several Occupational Analysis Field Centers operated by State employment security agencies in collaboration with the Manpower Administration: J. Edmund Phillips, California Occupational Analysis Field Center; Bessie J. Kuhn, Missouri Occupational Analysis Field Center; John W. Bridges, North Carolina Occupational Analysis Field Center; and Harry Nussberger, Wisconsin Occupational Analysis Field Center.

The final document was produced by the U.S. Training and Employment Service, with planning and general supervision by Leon Lewis, Assistant Chief, Division of Occupational Analysis and Career Information, and direct supervision by Adaline Padgett. The bibliography was prepared by Ruby L. Gill and Velma R. Watson.

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Introduction to Job Restructuring

WHAT IS JOB RESTRUCTURING?

Job restructuring is a special application of job analysis that involves the identification of jobs within the context of the system of which they are a part and the analysis and rearrangement of their tasks to achieve a desired purpose.

Although the term "job restructuring" is relatively new, the concept is not. Employers frequently find it necessary to rearrange or adjust the contents (tasks performed) of jobs within a system because of economic conditions, technological changes, inability to fill vacant positions, or other reasons. However, in the past arriving at satisfactory adjustments of job tasks was largely a matter of trial and error, due to the lack of a standardized methodology. This handbook describes the techniques and step-by-step procedures for this purpose.

Important to an understanding of job restructuring is the concept that a job does not exist alone but is related to a number of other jobs in a system. The interdependencies and relationships among the jobs in a system cannot be ignored. Job restructuring should be thought of not as changing one job, but rather as rearranging the contents of jobs within a system.

RELATIONSHIP OF JOB ANALYSIS TO JOB RESTRUCTURING

Job analysis is the basic technique used in job restructuring. Any activity in this area should begin with identification of the jobs within the system and analysis of the separate tasks[1] that comprise each of the jobs, followed by evaluation of the characteristics and relationships of these tasks.

[1] The distinct major activities that constitute logical and necessary steps in the performance of a job.

The methodology described in this handbook is a refinement of job analysis techniques developed by the U.S. Training and Employment Service. It involves the detailed analysis of each job in terms of: (1) The specific tasks performed by the worker; (2) the functioning of the worker in relation to data, people, and things; (3) the minimum general educational development required for satisfactory performance; (4) an estimation of the aptitudes required for satisfactory job performance; and (5) other significant worker traits requirements, such as physical demands, temperaments, and interests.

HOW JOB RESTRUCTURING CAN HELP

Developing this methodology was an outgrowth of the widely held belief that better utilization of available manpower can alleviate many of the manpower shortages experienced today. The potential of that manpower for more complex work can be developed through on-the-job training and experience. A major goal of manpower programs is, first, to increase employment opportunities at the entry level for persons who do not possess the necessary skills to compete in the labor market and then to create meaningful opportunities for these people to advance to higher level jobs as they acquire new skills through on-the-job training, formalized classroom instruction, and work experience. One way to achieve this goal is through application of the job restructuring techniques presented in this handbook.

The immediate benefits of job restructuring are twofold. It frees experienced personnel to spend more time performing higher level tasks, and creates lower level jobs that can be filled by inexperienced persons or workers who now lack the ability to perform higher level tasks. A significant result is new employment opportunities for disadvantaged persons.

Inherent in the concept of better utilization of manpower resources is the development of manpower potential.[2] In job restructuring the analyst should be interested not only in creating entry-level positions, but also in trying to devise meaningful promotional opportunities. The job restructuring methodology enables the analyst to design a series of career lattices. (Chart 3 shows a sample career lattice.) The career lattice utilizes the interrelationships among jobs to create promotional opportunities and facilitate mobility of workers among jobs. A career lattice provides for mobility in three directions: horizontal mobility to jobs at the same relative level of complexity but in a different area of work, vertical mobility to more complex jobs in the same area of work, and diagonal mobility to more complex jobs in a different but related area of work.

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[2] *Developing Your Manpower* (Washington: U.S. Department of Labor, Manpower Administration, 1969). For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Approach to a Job Restructuring Study

The support of management is basic to a successful job restructuring study. If an organization is running smoothly and has no particular recruitment problems, the employer may be reluctant to make any job changes.

The analyst should be well prepared before approaching an employer with a job restructuring proposal. The employer may have a number of questions regarding the conduct of such a study. For example, he may ask:

- Would it interrupt operations?
- What costs may be incurred?
- Would it affect the morale of present employees?
- How long would the study take?
- How much time would it take to implement the restructured jobs to achieve full production or render more efficient service?
- What assistance, if any, could be expected from Government agencies?
- What effect would it have on established wage structures, on-the-job training programs, and promotional opportunities or established career ladders?

The analyst should familiarize himself with the organization before making initial contact and be ready to discuss any questions that the employer may raise.

The scope of the restructuring study must be determined during discussions with management. At this time the analyst must impress upon management that jobs are not independent but instead are part of a system. (This is discussed in greater detail in the section on Procedure for Job Restructuring.) Because of the interdependencies and relationships among jobs that comprise a system, better results from restructuring can be obtained if a number of jobs in the system are considered for restructuring simultaneously. Best results can be derived if all the jobs in a system are considered, thus permitting the analyst to analyze each component task required to accomplish the purpose of the system and group these tasks into restructured jobs following the steps outlined in this methodology.

Once the support of management has been obtained, the analyst should ask management to familiarize supervisory personnel with the program and enlist their support in the restructuring effort. Through the supervisory personnel, all employees of the establishment should be informed of the purpose of the program, how long it will take, and how it will be conducted. The support and cooperation of everyone connected with the establishment are essential to any type of job analysis, especially when the analysis is being made for job restructuring purposes.

Before beginning the analysis or at least before the actual restructuring process, the analyst must be aware of the abilities and potentials of the applicants who will be considered for the restructured jobs. This does not imply that the analyst will attempt to use restructuring to tailor-make each job for a particular individual. However, it does imply that the analyst must be aware of the characteristics of the potential workers as a group, in terms of experience, aptitudes, educational development, and physical abilities to give him some idea of how to regroup the job tasks to better utilize the potentials of the available manpower. Information of this kind may be obtained from such sources as local offices of the State employment services and other local manpower service organizations.

Preparation for Job Restructuring

JOB SYSTEMS

Few jobs are totally self-contained. Normally a job is interrelated with other jobs in a system; it involves tasks that accomplish only a segment of a larger process or service. A particular job is related in various ways to the other jobs, or segments of the total work to be performed, that precede or follow it in the sequence of operations or activities. When restructuring, the analyst must consider these interrelationships, even if only one or a few jobs in the system are being considered for restructuring.

To study these relationships, the analyst needs to look at the overall organization and purpose of the whole establishment, hierarchical relationships, promotional possibilities, work flow (sequence of operations), and plant layout. The analyst should prepare an organization chart, a process flow chart, and a staffing schedule to help him understand these job relationships.

ORGANIZATION CHART

An organization chart shows graphically the setup of a firm or other organization, including the relationships between its subdivisions, and the composition and distribution of its personnel. A simple way of developing such a chart is to write the name of each unit in the organization on a separate slip of paper, arrange these slips in echelons, and place units at the same organizational level side by side. Once a rough draft of the resulting layout is sketched, with a box for each organizational unit, the job titles of positions in each unit can be added to the appropriate box. (See sample organization chart, p. 11.)

PROCESS FLOW CHART

A process flow chart graphically depicts the workflow of an establishment. It should indicate the normal sequence of operations there. If the chart is kept simple, it is no more difficult to prepare than an organization chart. Frequently, the analyst can find such charts in technical books or similar publications and adapt one or more to the situation in the establishment he is studying. (See sample process flow chart, p. 12.)

STAFFINC SCHEDULE

A staffing schedule is an inventory of an establishment's work force. It shows current organizational and staffing patterns of the firm and indicates the distribution of work skills and the uses being made of those skills.

The information included in a staffing schedule consists of an accurate identification of all jobs in the establishment, administrative and supervisory as well as clerical and production, in terms of plant titles and, when available, titles and codes from the *Dictionary of Occupational Titles*.[3] The schedule shows the departmental structure of the establishment, the number of workers employed in each department, and the number of workers employed in each job within each department. It also includes a narrative statement of the major processes and products of the organization.

Staffing schedules help to identify organizational weaknesses, departmental overstaffing or understaffing, and hiring needs to be filled through recruitment and selection of additional workers; transfer, upgrading, or training of present employees; or restructuring of selected jobs to overcome skill shortages and utilize the potentials of the available manpower supply.

[3] *Dictionary of Occupational Titles* (2 vols.; 3d ed.; Washington: U.S. Department of Labor, Manpower Administration, 1965). For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

INSTRUCTIONS FOR COMPLETING THE STAFFING SCHEDULE

The staffing schedule for an establishment consists of one face sheet and as many title sheets as are required to identify all units in the establishment and list the job titles and related information for each. (The first page of the sample schedule that starts on p. 7 is a face sheet; the following pages are title sheets.)

The face sheet should contain identification data, such as the name of the establishment being studied, its Standard Industrial Classification code and title,[4] the products manufactured or services rendered, and the name of the analyst engaged in the study. (See sample face sheet on p. 7.)

The title sheets should contain listings of jobs within the organizational units by plant titles and by corresponding titles and codes in the *Dictionary of Occupational Titles.* In addition, this form provides space for recording the number of workers employed in each job, and any comments pertinent to the study. (See sample title sheets starting on p. 8.)

The following is a step-by-step procedure for preparing the title sheets:

Title Sheet No.: The number of each sheet should be combined with the total number of sheets in the form of a fraction, such as 1/18, 2/18, and 3/18.

Establishment: Enter name of the establishment.

Unit: Enter the name of the establishment unit (department, section, etc.) as it is designated in the establishment. Ordinarily each unit listing should start on a new title sheet, but if the listings are short, two or more units may be recorded on one sheet. When this is done, at least two lines should be left blank between unit listings. Every attempt should be made to group jobs in units by functions or processes.

Number of employees in unit: Enter the total number of employees in the unit at the time the study was made.

Number: Each job entry should be numbered beginning with number 1 for the first job listing for each unit. For example, if there are 15 jobs in the first unit listed, the numbers should run from 1 to 15; and if there are 8 jobs in the next unit listed, the numbers should run from 1 to 8.

Job title: Record, in initial capitals, the job title used by the establishment. If more than one title is used in the establishment to identify the same job, enter the most commonly used or most descriptive title as the main title. Any additional or alternate titles used should be listed on the reverse side of the title sheet and identified with the appropriate main title.

No. employed: Record in the column headed "M" the number of male workers on the job, in the column headed "F" the number of female workers, and in the column headed "T" the total workers employed on the job. If the establishment is working more than one shift daily, the number employed on each shift should be entered separately, one below the other, opposite the job title.

Dictionary of Occupational Titles: These columns provide space for converting each establishment job title into a title and code number from the *Dictionary of Occupational Titles* (DOT) and then entering the worker traits (WT) group page number on which the DOT job appears. If an establishment job cannot be converted, the DOT columns should be left blank.

Before an analyst can convert an establishment job, he must have a concept of its duties. Since plant job titles may be indicative of these duties but are often misleading, he needs to find out what tasks are actually performed on the job. To learn this, he should observe a worker performing his duties and/or discuss the job with the worker and/or his supervisor.

Once the analyst understands the jobs in the establishment's organizational unit, he is ready to compare them with definitions in the DOT. Before he actually starts making comparisons, however, he should be aware that the activities described in a DOT definition frequently will not coincide exactly with those of the establishment job. The DOT defines most jobs in broad, all-inclusive terms. It defines a typical job in any establishment rather than a specific one in a particular firm.

The analyst must weigh the importance of differences between an establishment job and *Dictionary* definitions of like jobs. If the differences are significant, no conversion should be made. On the other hand, differences in minor tasks should not obscure the fact that the jobs are essentially the same.

To locate DOT titles and definitions for comparison with establishment job titles and tasks, use the following procedure:

1. Search for the establishment's job title in volume I of the *Dictionary of Occupational Titles.* If you find it, compare the definition with the tasks of the establishment's job. If you cannot locate the establishment's job title, try using synonyms, inversions, or contractions of the title.

2. If you are still unable to locate the job, check the section on Occupational Group Arrangement of Titles and Codes in volume II, and then turn back to the defi-

[4] *Standard Industrial Classification Manual* (Washington: Executive Office of the President, Bureau of the Budget, 1967). For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

nitions of the jobs in volume I to determine if one covers the establishment's job.

3. As a further check, you can scan the appropriate listings of titles under Industry Arrangement of Titles in volume II and examine the definitions of the appropriate titles to determine whether they cover the establishment's job.

If you decide that a job is similar in all significant respects to a definition in the DOT, enter the DOT title (in all capital letters) in the appropriate column of the title sheet. In the next column, enter the code number that appears after the job title in volume I of the DOT.

Next, in the Supplement[5] to the DOT, turn to the DOT code number you have listed and find the WT group page number opposite it. This number refers to the page in volume II of the *Dictionary* that contains facts about the workers trait group in which the job appears. Enter this number in the appropriate column of the title sheet.

Entry Job: If the employer will accept a worker who is not presently qualified for the job but has potential for it, place an "X" in this column. Otherwise, leave it blank.

[5] *A Supplement to the Dictionary of Occupational Titles* (3d ed.; Washington: U.S. Department of Labor, Manpower Administration, 1966). For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Face sheet

CONFIDENTIAL

MANPOWER ADMINISTRATION
U.S. Training and Employment Service

STAFFING SCHEDULE
and
JOB ANALYSIS PLANNING REPORT

Number of Title Sheets Attached: 3

Signature: J. D. Smith Date:

Number of Employees: 63

Establishment: Acme Medical Apparatus Co.

Standard Industrial Classification Code and Title: 3693 – Medical X-ray apparatus and tubes; electromedical and electrotherapeutic apparatus

Products Manufactured or Services Rendered: This firm manufactures medical electronic apparatus such as: Respirometers, polygraphs, fraction collectors, electrophoresis equipment, and a variety of other products.

Remarks: This firm produces items which are made to order and, in some cases, may be considered experimental because so few are built. Considerable difficulty is experienced in obtaining enough qualified assemblers, and training programs have proven to be "not practical." Therefore, a continuing demand for assemblers exists.

Title sheet No. 1/3

MANPOWER ADMINISTRATION
U.S. Training and Employment Service

CONFIDENTIAL
STAFFING SCHEDULE
for
JOB RESTRUCTURING

(Enter any additional comments on reverse side)

Establishment: Acme Medical Apparatus Co.

Unit: Managerial

No. Employees in Unit: 2

Number	Job Title	No. Employed			Dictionary of Occupational Titles			Entry Job	Comments
		M	F	T	Title	Code	WT Group Page No.		
1	President	1	0	1	PRESIDENT	189.118	237		
2	Vice President	1	0	1	VICE PRESIDENT	189.118	237		

Establishment: Acme Medical Apparatus Co.

Unit: Personnel & Clerical

No. Employees in Unit: 8

Number	Job Title	No. Employed			Dictionary of Occupational Titles			Entry Job	Comments
		M	F	T	Title	Code	WT Group Page No.		
1	Office Manager	1	0	1	MANAGER, INDUSTRIAL ORGANIZATION	189.118	237		
2	Personnel Officer	1	0	1	MANAGER, PERSONNEL	166.118	228		
3	Secretary	0	3	3	SECRETARY	201.368	263		
4	Bookkeeper	1	0	1	BOOKKEEPER I	210.388	280		
5	Stock Clerk	2	0	2	STOCK-CONTROL CLERK	223.387	271		

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Title sheet No. 2/3

MANPOWER ADMINISTRATION
U.S. Training and Employment Service

CONFIDENTIAL
STAFFING SCHEDULE
for
JOB RESTRUCTURING

(Enter any additional comments on reverse side)

Establishment: Acme Medical Apparatus Co.

Unit: Engineering

No. Employees in Unit: 9

Number	Job Title	No. Employed			Dictionary of Occupational Titles			Entry Job	Comments
		M	F	T	Title	Code	WT Group Page No.		
1	Design Engineer	3	0	3	MECHANICAL ENGINEER	007.081	371		
2	Technician	2	0	2	MECHANICAL-ENGINEERING TECHNICIAN	007.181	379		
3	Technician Aid	4	0	4					

Establishment: Acme Medical Apparatus Co.

Unit: Shop

No. Employees in Unit: 42

Number	Job Title	No. Employed			Dictionary of Occupational Titles			Entry Job	Comments
		M	F	T	Title	Code	WT Group Page No.		
1	Foreman	1	0	1					
2	Maintenance Man	1	0	1	MAINTENANCE MECHANIC II	638.281	312		
3	Electronics Assembler	31	8	39					
4	Sweeper	1	0	1	PORTER II	381.887	360		

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Title sheet No. 3/3

MANPOWER ADMINISTRATION
U.S. Training and Employment Service

CONFIDENTIAL
STAFFING SCHEDULE
for
JOB RESTRUCTURING

(Enter any additional comments on reverse side)

Establishment: Acme Medical Apparatus Co.

No. Employees in Unit: 2

Unit: Procurement

Number	Job Title	No. Employed			Dictionary of Occupational Titles			Entry Job	Comments
		M	F	T	Title	Code	WT Group Page No.		
1	Purchasing Agent	1	0	1	PURCHASING AGENT	162.158	484		
2	Purchasing Agent Assistant	1	0	1					

Chart 1

Organization Chart

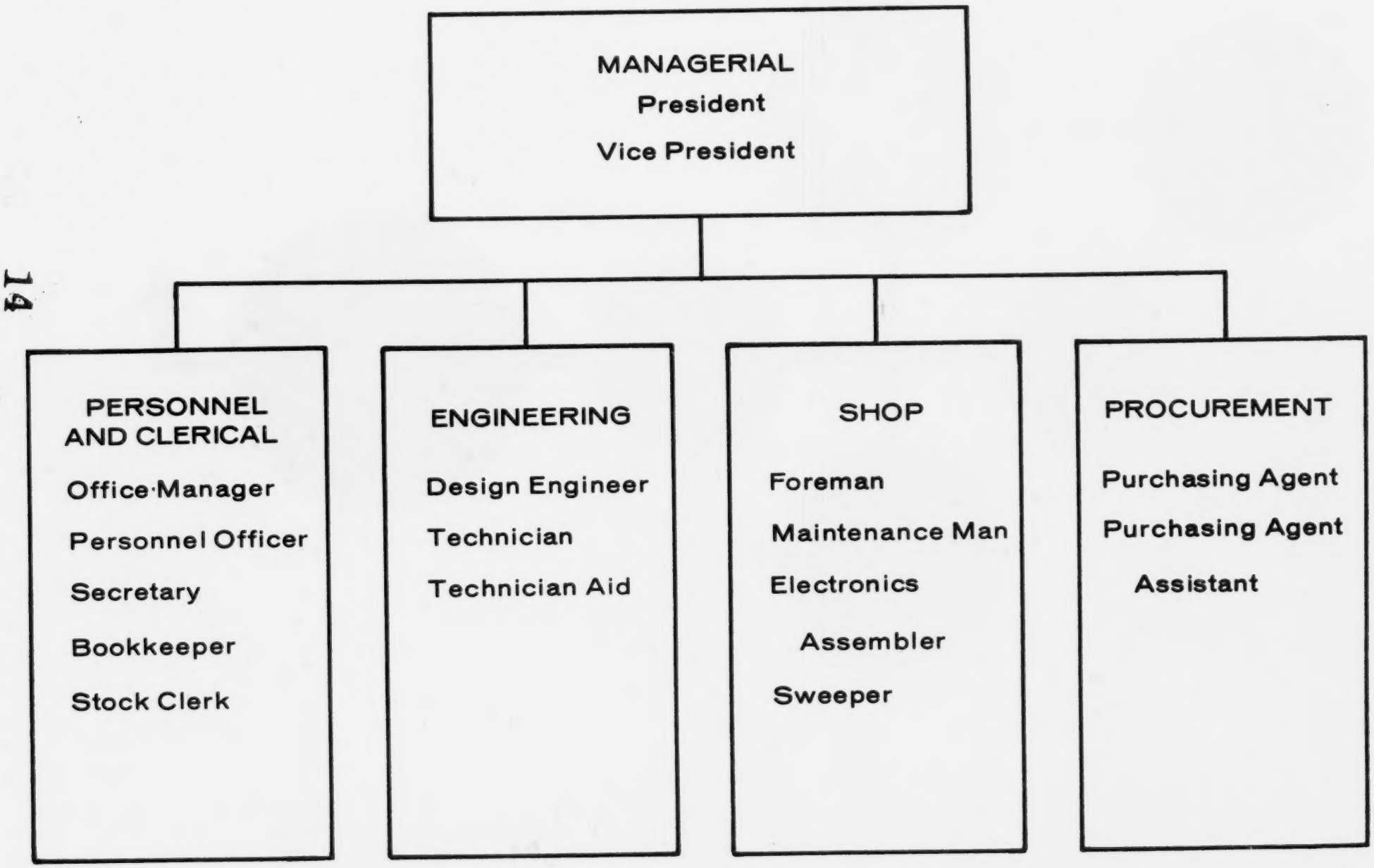
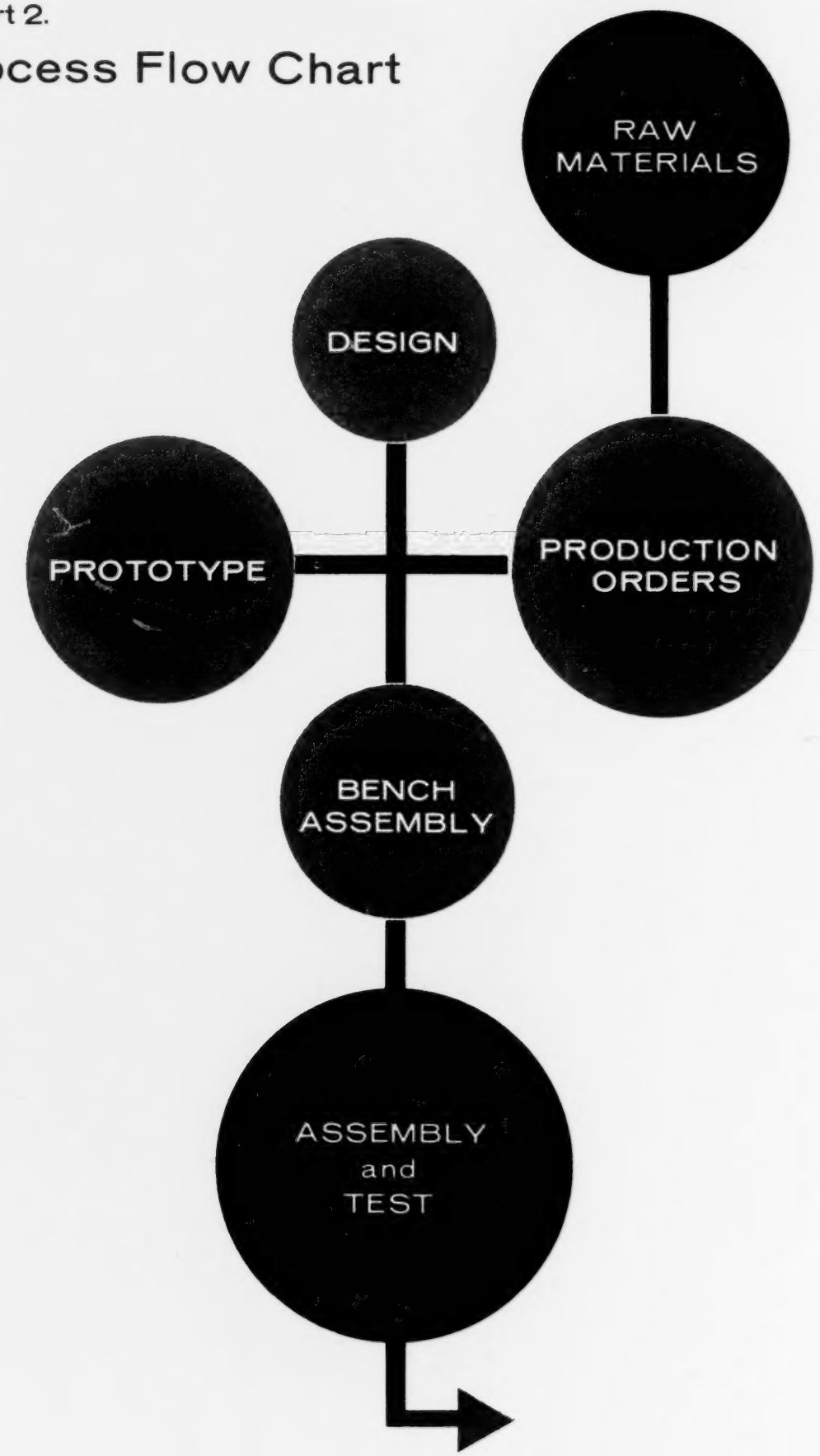


Chart 2.

Process Flow Chart



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Methodology for Job Restructuring

FLOW CHART FOR JOB RESTRUCTURING

STEP 1	Determine the relationship of the job(s) to the system of which they are a part.
STEP 2	Describe in detail the tasks that comprise each job. Record them on worksheet.
STEP 3	Estimate the time required to perform each task during the average workday. Record the estimate on worksheet.
STEP 4	Rate each task in relation to worker functions. Record ratings on worksheet.
STEP 5	Rate each task in terms of general educational development (GED). Record ratings on worksheet.
STEP 6	Rate each task in relation to important aptitudes. Record ratings on worksheet.
STEP 7	Evaluate each task in relation to other important worker traits and record ratings on worksheet.
STEP 8	Group tasks according to worker functions, GED, aptitudes, and other pertinent worker traits.
STEP 9	Record groupings of tasks on worksheets.
STEP 10	Evaluate groups in terms of kind of work performed or technology involved.
STEP 11	Review the process flow, establishment layout, and machinery and equipment to determine if tentative groups are feasible in this respect.
STEP 12	Consider career lattice possibilities.
STEP 13	Determine if cumulative totals of estimates of workday time for the tasks in tentative groups will justify full-time jobs.
STEP 14	Evaluate and adjust groups until most feasible and practical arrangements of tasks are developed.
STEP 15	Prepare detailed job descriptions.
STEP 16	Prepare career lattices.
STEP 17	Follow up after implementation of the job restructuring activity.

PROCEDURE FOR JOB RESTRUCTURING

Job analysis as the basis of job restructuring should provide a more realistic and effective result in the job structure of an organization.

Objective information about the jobs to be restructured can be obtained in several ways—by observing the work situation; by interviewing workers, supervisors, and personnel specialists; or by referring to prepared company job descriptions or previously prepared job analysis materials. However, the most complete information can be obtained through a combination of the observation and the interview methods. The information gained during interviews should include estimates of the time spent on each task for use in step 3.

Step 1 Determine the Relationship of the Job(s) to the System of Which They are a Part.

The first step in job restructuring is to determine exactly what the jobs and their limits are—where the jobs begin and where they end. For this purpose, the analyst should review the staffing schedule he has prepared. Once he has identified the jobs to be studied, he should proceed to analyze each in accordance with the remaining steps of this procedure.

Step 2 Describe in Detail the Tasks That Comprise Each Job. Record Them on Worksheet.

The effectiveness of restructuring may depend upon the analyst's ability to recognize the component tasks that comprise each of the jobs in the system.

The tasks should be recorded in outline form on the worksheet. (See the sample job restructuring worksheet.) A terse, direct writing style is preferable. If possible, each sentence should begin with an action verb and should be written in the present tense. Adjectives that reflect subjective judgment of the analyst should be avoided.

The tasks that comprise each job should be listed together on a separate worksheet. This will result in listings of tasks within the existing boundaries of the job at the time of the analysis.

Tasks should be listed, when possible, according to the sequence of operations to facilitate the subsequent grouping process. Note that process flow or plant layout may dictate a fixed sequence for certain tasks; such factors should be noted beside the affected tasks to prevent a meaningless grouping of tasks.

Step 3 Estimate the Time Required to Perform Each Task During the Average Workday. Record the Estimate on Worksheet.

During the task analysis the analyst determines the amount of time the worker spends in the performance of each task during the average workday. Estimates made by consulting either the worker whose job is being observed or the worker's supervisor usually will be sufficiently accurate for planning job restructuring.

Step 4 Rate Each Task in Relation to Worker Functions. Record Ratings on Worksheet.

Each task can be evaluated and rated in terms of how the worker functions in relation to data, people, and things. These relationships are defined in three worker function hierarchies. (See p. 25 for definitions of worker functions in each hierarchy.) Each task should be assigned the worker function in each hierarchy that most closely describes the activities listed in the task description. The result will be a three-part rating, expressing the estimated functional level of the task, such as the following:

DATA: Comparing (6)
PEOPLE: Speaking-signaling (6)
THINGS: Feeding-offbearing (6)

This functional level would be expressed on the worksheet as 666.

Step 5 Rate Each Task in Terms of General Educational Development (GED). Record Ratings on Worksheet.

Determine the level of GED required for a worker to acquire the background knowledge needed and follow the instructions for performing his job in a specific situation. Evaluate each task in terms of the three categories of the GED scale—reasoning, mathematical, and language development. (See Scale of General Educational Development, p. 27.) After determining the level required in each category, select the highest of these to express the GED rating for the task. Record the number of the selected level on the worksheet.

Step 6 Rate Each Task in Relation to Important Aptitudes. Record Ratings on Worksheet.

Consider each task in relation to each of the 11 aptitudes described in the section on Aptitudes in this manual. (See p. 30.) Decide which of these aptitudes are important to the performance of the task and estimate the level of the aptitude required for satisfactory (average) performance, according to criteria given. Record important aptitudes and their respective ratings on the worksheet.

(Sample Form)

JOB RESTRUCTURING WORKSHEET

Establishment Job Title _____ No. Employed _____ DOT Title and Code _____ Date _____

Department _____ Supervisor _____ Title _____ Analyst _____

Task Description	Time	Functions			GED	Important Aptitudes	Other Pertinent Worker Traits	Comments
		D	P	T				

Step 7 Evaluate Each Task in Relation to Other Important Worker Traits and Record Ratings on Worksheet.

Although this method uses the concepts of worker functions, GED, and aptitudes as primary considerations in separating and grouping job tasks, other worker traits are sometimes important. For example, when restructuring to develop jobs for physically handicapped, physical demands and environmental conditions are basic considerations. When restructuring is for the mentally retarded or emotionally disturbed, temperaments are frequently pertinent, as they relate to the responsibilities placed on the worker and the interpersonal relationships in the work situation. (See pp. 40 through 42 for identification and definitions of these worker traits.) The analyst should be familiar with interests, temperaments, physical demands, and environmental conditions so that he can recognize the pertinency of these traits to specific tasks. Record pertinent factors on the worksheet.

Step 8 Group Tasks According to Worker Functions, GED, Aptitudes, and Other Pertinent Worker Traits.

Consider worker function, GED, and aptitude ratings that have been assigned to the tasks, to determine where enough similarity exists to permit grouping of tasks on these bases. Specifically, those tasks that have been rated for similar or closely related levels of worker functions and, correspondingly, similar or closely related levels of GED and important aptitudes should be tentatively grouped for further inspection according to additional criteria. (See Job Restructuring Example.)

Step 9 Record Groupings of Tasks on Worksheets.

Copy onto separate worksheets those tasks that seem most suitable for grouping into jobs according to the considerations listed in step 8. Each group should be on a separate worksheet.

Step 10 Evaluate Groups by Kind of Work Performed or Technology.

Determine if tasks grouped together involve the same or related technologies. It would be difficult to keep all jobs pure according to the type of work performed, but jobs should contain tasks as similar or related in this respect as possible.

Step 11 Review Process Flow, Establishment Layout, and Machinery and Equipment to Determine if Tentative Groups are Feasible.

Review the process flow, establishment layout, and availability of machinery and equipment to determine if the tasks being considered for grouping can be performed without interrupting the sequence of operations. Adjust or rearrange tasks, if possible, to accomplish this purpose.

Step 12 Consider Career Lattice Possibilities.

Review the ratings of the tasks within the groups being considered as possible jobs to determine if these jobs would relate to each other and to other jobs in the establishment to permit the development of meaningful career lattices. Workers should be able to begin on less complex jobs and become qualified for promotion to more complex ones through work experience, on-the-job training, and/or classroom training. Promotional opportunities provided in the original job structure of the establishment should be considered in restructuring. They can be evaluated by studying the organization chart and staffing schedule and by discussing them with establishment officials.

Step 13 Determine if Cumulative Totals of Estimates of Workday Time for Tasks in Tentative Groups Will Justify Full-Time Jobs.

Determine if the cumulative totals of estimates of workday time for the tasks considered for grouping will justify full-time jobs. Remember that the number of persons performing the tasks in the original job can affect total time required. The employer may desire an increase or decrease in the amount of time spent on certain tasks in the restructured situation. If so, the analyst should determine the feasibility of doing this.

Step 14 Evaluate and Adjust Groups Until Most Feasible and Practical Arrangements of Tasks are Developed.

a. If there are too many tasks for a job in one group, experiment with transferring tasks to another group.

b. Consider adding tasks at similar or related levels if there are not enough tasks in a group to form a meaningful job.

c. Consider increasing the time spent on certain tasks if it appears practical.

d. Review the ratings of the tasks within each group and determine how

each group would be rated if considered as a job. This will help determine whether the proposed job is in keeping with the specific purpose(s) of restructuring and evaluate its position in the system of jobs being analyzed.

Step 15 Prepare Detailed Job Descriptions.

After all adjustments have been made in the groupings of tasks for restructured jobs, prepare final, detailed job descriptions. In addition to copying all tasks from the restructuring worksheet, the analyst may need to add transitional statements to make the descriptions read smoothly. These detailed job descriptions will be used by the employer in implementing the restructured job program.

Step 16 Prepare Career Lattices.

Prepare charts to indicate the relationships among jobs in the establishment. These charts should indicate vertical, horizontal, and diagonal mobility among jobs (career lattices). (See the sample career lattice shown in chart 3, p. 24.)

Step 17 Follow up After Implementation of the Job Restructuring Activity.

The restructured jobs should be evaluated approximately 3 months after they have been implemented by the employer. This period should provide ample time for any problems that may arise to become evident. At this time changes should be made to correct such problems. It is assumed that the employer will correct obvious deficiencies as they appear while implementing the program, but a followup evaluation of the entire program will insure that corrective action is taken and, possibly, will help prevent any future problems.

JOB RESTRUCTURING EXAMPLE

This example of restructuring was developed to illustrate more clearly the methodology described in this handbook. However, many variations will be encountered in actual practice and method adjustments may be necessary.

Data Collection

The example occurs in a plant producing medical apparatus, such as polygraphs. The plant is unable to fill orders within reasonable time limits because of a shortage of skilled electronic assemblers. A supply of applicants for entry-level jobs is available. However, before restructuring was started, they had not been considered as a potential solution to the recruitment problem.

The example that follows shows how the restructuring methodology can be applied to create both entry and promotional opportunities for workers and, at the same time, provide satisfactory workers for the employer.

The worksheet on page 19 lists all the tasks that comprise the original job with appropriate ratings for each task.

An analysis of these tasks and ratings in accordance with the criteria described in the methodology reveals the possibility of restructuring the job content as follows:

Rationale for Grouping

A review of the worker functions, GED, and aptitudes ratings indicates that two core groups of tasks can be identified and developed, based on the following rating profiles:

Tasks	Worker functions	GED	Important aptitudes
Core group I	687	1,2	S-4; K-4; and M-3,4.
Core group II	684,381	3	S-3; P-3,4; K-3; F-3; and M-3.

It should be noted that three tasks have ratings that do not fall into either of the above rating profiles:

–Task No. 1: Requires worker functions 367, GED 3, and aptitudes V-3, N-3, and Q-4. Although the GED rating is the same as the one for the tasks in core group II, the other ratings are not.

–Task No. 9: Requires worker functions 684, GED 2, and aptitudes S-4, K-3, F-3, and M-3. Some of these ratings fall into the profile for core group I and others into the profile for core group II.

–Task No. 12: Requires worker functions 381, GED 4, and aptitudes G-3, N-3, S-3, and P-3. It will be noted that the worker functions 381 and aptitudes S-3 and P-3 fit the rating profile of core group II; however, GED 4 and aptitudes G-3 and N-3 are different.

This is the point at which the analyst should consider the importance of other criteria, such as process flow, technology involved, and purpose of the worker actions. Taking these factors into account, he notes that all of the three tasks listed above contribute to and are usually required in conjunction with the tasks in core group II.

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Consequently, these tasks can be added to core group II (see the worksheet of job first developed from tasks in core group II, p. 20).

The tasks in core group I remain unchanged and comprise a job. (See the worksheet of job developed from tasks in core group I, p. 21). However, further analysis of the job developed from core group II indicates that some of the tasks may be rearranged, resulting in the development of a third job. A reappraisal of tasks Nos. 1, 4, and 12 reveals the following:

- Tasks Nos. 1 and 12 can be removed from the group and comprise a third job that would have a profile of worker functions 361; GED 4; and aptitudes G-3, V-3, N-3, Q-4, and P-3 (see the worksheet showing new job created from revision of job developed from core group II, p. 21).
- An analysis of the work performed and work flow reveals that task No. 4, although rated worker functions 381, cannot be separated from adjacent assembly tasks and, therefore, must be left with the tasks that remain in group II (see the worksheet showing revision of job developed from tasks in core group II, p. 22).

The original job was performed by 39 workers. By restructuring it into three jobs, the analyst has accomplished two purposes: 1) A less complex job has been developed to provide entry opportunities for the less than fully qualified individuals in the labor market; and 2) the qualified workers previously performing the job will now be able to devote full time to the performance of the two more complex jobs that have resulted. Consequently, the time factor for each task in these three newly created jobs has been increased.

Original Job

JOB RESTRUCTURING WORKSHEET

Establishment Job Title Electronics Assembler DOT Title and Code _____ No. Employed 39 Date _____

Department Assembly Supervisor John R. Doe Title Foreman Analyst S. W. Brown

Task description	Time (minutes)	Functions D	Functions P	Functions T	GED	Important aptitudes	Other pertinent worker traits	Comments
1. Reviews production order and requisitions appropriate parts from stockroom	30	3	6	7	3	V-3, N-3, Q-4	Near acuity	
2. Assembles numbered panels to form apparatus cabinet, using hand and power tools	60	6	8	7	2	S-4, K-4, M-4		
3. Attaches components such as motors, heaters, and cooling units to cabinets, using hand and power tools	90	6	8	4	3	S-3, K-3, F-3, M-3		
4. Connects and alines electronic parts such as photocells and relays, using handtools, test equipment, and diagrams	60	3	8	1	3	S-3, P-3, F-3	Near acuity	
5. Attaches terminals, plugs, rheostats, dials, and knobs, using handtools	15	6	8	4	3	K-3, F-3, M-3		
6. Solders wires to components and controls, using soldering iron and wiring diagrams	30	6	8	4	3	P-4, K-3, F-3, M-3	Near acuity	
7. Attaches resistors, transistors, and diodes to printed circuit board, using handtools, soldering iron, and diagram.	30	6	8	4	3	P-3, K-3, F-3, M-3	Near acuity	
8. Cleans cabinet and components, using cleaning solution and air hose	60	6	8	7	1	M-3		
9. Connects glass and plastic tubing and attaches valves, using handtools	15	6	8	4	2	S-4, K-3, F-3, M-3		
10. Attaches operating instructions and caution decals to unit, using water and squeegee	30	6	8	7	1	M-3		
11. Secures serial number plate to cabinet, using screwdriver, and records number on production order	15	6	8	7	1	K-4, F-4, M-4		
12. Tests and adjusts electronic parts and mechanisms to specified tolerances, using electronic and mechanical test, equipment, and handtools	45	3	8	1	4	G-3, N-3, S-3, P-3	Near acuity	

Job first developed from tasks in core group II

JOB RESTRUCTURING WORKSHEET

Establishment Job Title Electronics Assembler II DOT Title and Code _____ No. Employed _____ Date _____

Department Assembly Supervisor John R. Doe Title Foreman Analyst S. W. Brown

Task description	Time (minutes)	Functions D	Functions P	Functions T	GED	Important aptitudes	Other pertinent worker traits	Comments
1. Reviews production order and requisitions appropriate parts from stockroom	45	3	6	7	3	V-3, N-3, Q-4	Near acuity	
3. Attaches components such as motors, heaters, and cooling units to cabinets, using hand and power tools	120	6	8	4	3	S-3, K-3, F-3, M-3		
4. Connects and alines electronic parts such as photocells and relays, using handtools, test equipment, and diagrams	90	3	8	1	3	S-3, P-3, F-3	Near acuity	
5. Attaches terminals, plugs, rheostats, dials, and knobs, using handtools	30	6	8	4	3	K-3, F-3, M-3		
6. Solders wires to components and controls, using soldering iron and wiring diagrams	45	6	8	4	3	P-4, K-3, F-3, M-3	Near acuity	
7. Attaches resistors, transistors, and diodes to printed circuit board, using handtools, soldering iron and diagram.	45	6	8	4	3	P-3, K-3, F-3, M-3	Near acuity	
9. Connects glass and plastic tubing and attaches valves, using handtools	30	6	8	4	2	S-4, K-3, F-3, M-3		
12. Tests and adjusts electronic parts and mechanisms to specified tolerances, using electronic and mechanical test, equipment, and handyools	75	3	8	1	4	G-3, N-3, S-3, P-3	Near acuity	

Job developed from tasks in core group I

JOB RESTRUCTURING WORKSHEET

Establishment Job Title Electronics Assembler I DOT Title and Code _____ No. Employed _____ Date ___

Department Assembly Supervisor John R. Doe Title Foreman Analyst S. W. Brown

Task description	Time (minutes)	Functions D	Functions P	Functions T	GED	Important aptitudes	Other pertinent worker traits	Comments
2. Assembles numbered panels to form apparatus cabinet, using hand and power tools	240	6	8	7	2	S-4, K-4, M-4		
8. Cleans cabinet and components, using cleaning solution and air hose	90	6	8	7	1	M-3		
10. Attaches operating instructions and caution decals to unit, using water and squeegee	60	6	8	7	1	M-3		
11. Secures serial number plate to cabinet, using screwdriver, and records number on production order	90	6	8	7	1	K-4, F-4, M-4		

New job created from revision of job developed from core group II

JOB RESTRUCTURING WORKSHEET

Establishment Job Title Electronics Inspector DOT Title and Code _____ No. Employed _____ Date _____

Department Assembly Supervisor John R. Doe Title Foreman Analyst S. W. Brown

Task description	Time (minutes)	Functions D	Functions P	Functions T	GED	Important aptitudes	Other pertinent worker traits	Comments
1. Reviews production order and requisitions appropriate parts from stockroom.	180	3	6	7	3	V-3, N-3, Q-4	Near acuity	
12. Tests and adjusts electronic parts and mechanisms to specified tolerances, using electronic and mechanical test, equipment, and handtools	300	3	8	1	4	G-3, N-3, S-3, P-3	Near acuity	

Revision of job developed from tasks in core group II

JOB RESTRUCTURING WORKSHEET

Establishment Job Title Electronics Assembler II DOT Title and Code _____ No. Employed _____ Date _____

Department Assembly Supervisor John R. Doe Title Foreman Analyst S. W. Brown

Task description	Time (minutes)	Functions D	Functions P	Functions T	GED	Important aptitudes	Other pertinent worker traits	Comments
3. Attaches components such as motors, heaters, and cooling units to cabinets, using hand and power tools	180	6	8	4	3	S-3, K-3, F-3, M-3		
4. Connects and alines electronic parts such as photocells and relays, using handtools, test equipment, and diagrams	120	3	8	1	3	S-3, P-3, F-3	Near acuity	
5. Attaches terminals, plugs, rheostats, dials, and knobs, using handtools	30	6	8	4	3	K-3, F-3, M-3		
6. Solders wires to components and controls, using soldering iron and wiring diagrams	60	6	8	4	3	P-4, K-3, F-3, M-3	Near acuity	
7. Attaches resistors, transistors, and diodes to printed circuit board, using handtools, soldering iron, and diagram.	60	6	8	4	3	P-3, K-3, F-3, M-3	Near acuity	
9. Connects glass and plastic tubing and attaches valves, using handtools	30	6	8	4	2	S-4, K-3, F-3, M-3		

CAREER LATTICE

After the analyst finishes the immediate restructuring activity, he should then proceed to identify the possible horizontal, vertical, and diagonal mobility paths that may exist for a worker in the job system involved. The data for such determinations are contained in the staffing schedule, and especially in the job activities and their codes. In this example the following steps and rationale would be involved:

1. The analyst must first assign DOT codes to the three jobs resulting from restructuring. The codes are arrived at according to the concepts and principles contained in "The Occupational Classification and Code" section of volume I of the DOT. Since the jobs are involved with the assembly of electronic apparatus, the first three digits of the code would be 729. The last three digits of the code are based on the analyst's judgment in assessing each job's involvement with data, people, and things. The analyst should arrive at .887 as the last three digits for Electronics Assembler I; at .884 for Electronics Assembler II; and at .381 for Electronics Inspector.

2. The staffing schedule shows four jobs for which there are no DOT titles and codes. Of these, the job of Electronics Assembler was restructured. However, it is necessary to code the other three jobs following the approach described above. The following codes will result: 007.381 for Technician Aid, 729.131 for Foreman, and 162.358 for Purchasing Agent Assistant

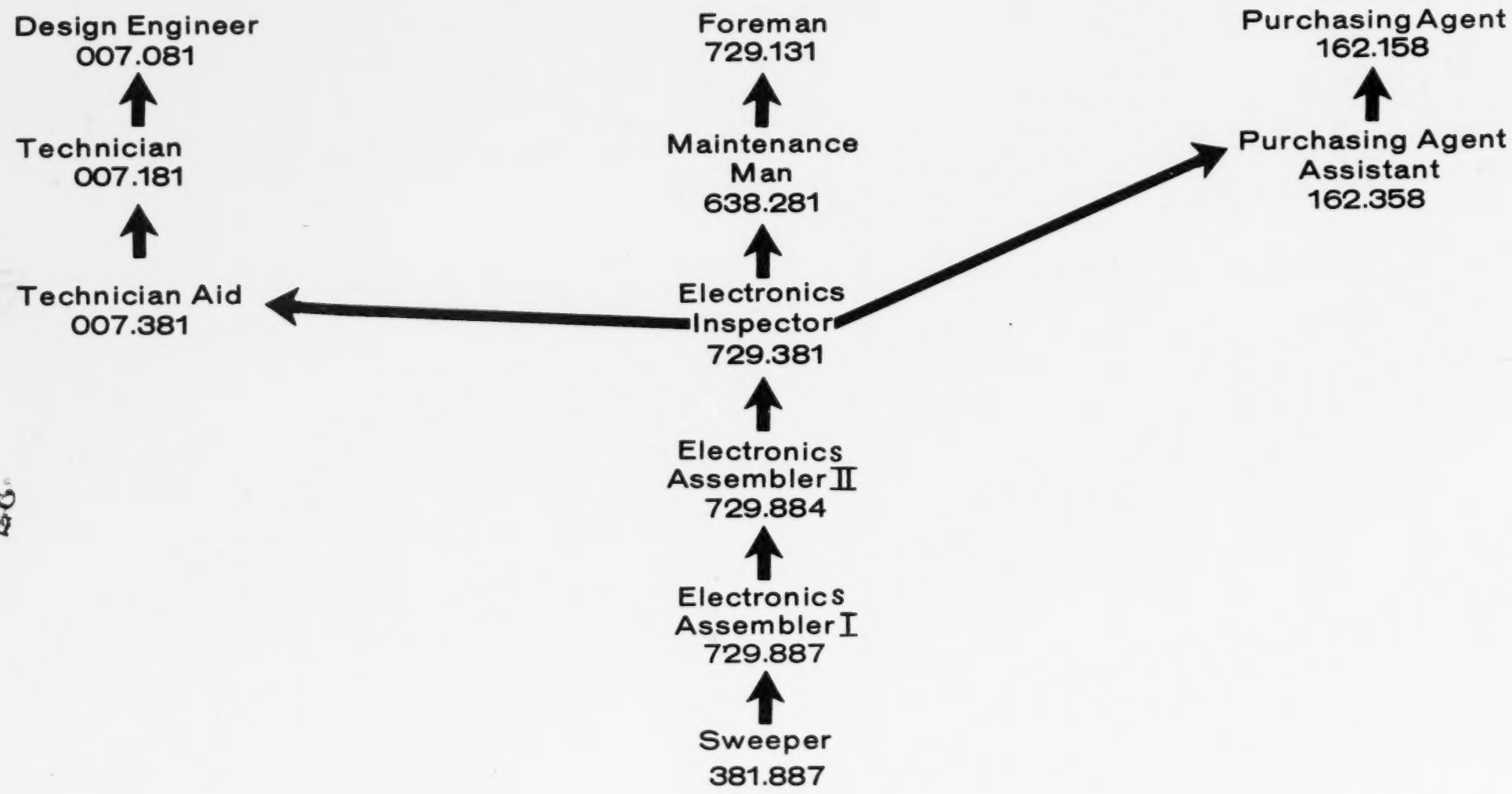
3. The analyst will then appraise all jobs on the staffing schedule for possibilities of promotion and/or transfer within the immediate job system and across individual job systems in the organization. There are various criteria which will help in making this determination, such as: Similarities or relationships among technologies; general educational development and aptitudinal requirements; and, when significant, physical demands requirements. In addition, information should be obtained concerning recruitment, transfer, and promotional policies of the establishment and union requirements affecting these activities, if applicable.

According to these criteria, in this particular job system possibilities exist, based on additional orientation and/or training, for the Electronics Inspector to transfer to Technician Aid or Purchasing Agent Assistant and for a direct vertical career path from Sweeper to Electronics Assembler I; Electronics Assembler I to Electronics Assembler II; Electronics Assembler II to Electronics Inspector; Inspector to Maintenance Man; and Maintenance Man to Foreman. There is also a possibility of the Inspector moving directly to Foreman, and, in some situations, the Assembler II to Foreman.

4. Data reflecting entry, promotional, and transfer opportunities should be presented in chart form (see chart 3). This career lattice will vary in structure according to the job system it reflects.

Chart 3

Career Lattice



Components and Benchmarks

WORKER FUNCTIONS

Every task in a job requires the worker to function in relation to data, people, and things in varying degrees. These relationships are expressed in terms of worker functions and are arranged in a hierarchy for each relationship from the simple to the complex in such a manner that, generally, each successive function can include those that are simpler and exclude those that are more complex. A combination of the highest functions which the worker performs in relation to data, people, and things expresses the total level of complexity for the task-worker situation.

Structure of Worker Functions

DATA (1st digit)	PEOPLE (2d digit)	THINGS (3d digit)
0 Synthesizing	0 Mentoring	0 Setting-Up
1 Coordinating	1 Negotiating	1 Precision Working
2 Analyzing	2 Instructing	2 Operating–Controlling
3 Compiling	3 Supervising	3 Driving–Operating
4 Computing	4 Diverting	4 Manipulating
5 Copying	5 Persuading	5 Tending
6 Comparing	6 Speaking–Signaling	6 Feeding–Offbearing
	7 Serving	7 Handling
	8 Taking Instructions–Helping	

DATA: Information, knowledge, and conceptions related to data, people, or things, obtained by observation, investigation, interpretation, visualization, mental creation; incapable of being touched; written data take the form of numbers, words, symbols; other data are ideas, concepts, oral verbalization.

0 Synthesizing: Integrating analyses of data to discover facts and/or develop knowledge, concepts, or interpretations.

1 Coordinating: Determining time, place, and sequence of operations or action to be taken on the basis of analysis of data; executing determinations and/or reporting on events.

2 Analyzing: Examining and evaluating data. Presenting alternative actions in relation to the evaluation is frequently involved.

3 Compiling: Gathering, collating, or classifying information about data, people, or things. Reporting and/or carrying out a prescribed action in relation to the information is frequently involved.

4 Computing: Performing arithmetic operations and reporting on and/or carrying out a prescribed action in relation to them. Does not include counting.

5 Copying: Transcribing, entering, or posting data.

6 Comparing: Judging the readily observable functional, structural, or compositional characteristics (whether similar to or divergent from obvious standards) of data, people, or things.

PEOPLE: Human beings; also animals dealt with on an individual basis as if they were human.

0 Mentoring: Dealing with individuals in terms of their total personality in order to advise, counsel, and/or guide them with regard to problems that may be resolved by legal, scientific, clinical, spiritual, and/or other professional principles.

1 Negotiating: Exchanging ideas, information, and opinions with others to formulate policies and programs and/or arrive jointly at decisions, conclusions, or solutions.

2 Instructing: Teaching subject matter to others, or training others (including animals) through explanation, demonstration, and supervised practice; or

making recommendations on the basis of technical disciplines.

3 Supervising: Determining or interpreting work procedures for a group of workers, assigning specific duties to them, maintaining harmonious relations among them, and promoting efficiency.

4 Diverting: Amusing others.

5 Persuading: Influencing others in favor of a product, service, or point of view.

6 Speaking-Signaling: Talking with and/or signaling people to convey or exchange information. Includes giving assignments and/or directions to helpers or assistants.

7 Serving: Attending to the needs or requests of people or animals or the expressed or implicit wishes of people. Immediate response is involved.

8 Taking Instructions-Helping: Attending to the work assignment instructions or orders of supervisor. (No immediate response required unless clarification of instructions or orders is needed.) Helping applies to "nonlearning" helpers.

THINGS: Inanimate objects as distinguished from human beings, substances, or materials; machines, tools, equipment; products. A thing is tangible and has shape, form, and other physical characteristics.

0 Setting-Up: Adjusting machines or equipment by replacing or altering tools, jigs, fixtures, and attachments to prepare them to perform their functions, change their performance, or restore their proper functioning if they break down. Workers who set up and personally operate a variety of machines are included here.

1 Precision Working: Using body members and/or tools or work aids to work, move, guide, or place objects or materials in situations where ultimate responsibility for the attainment of standards occurs and selection of appropriate tools, objects, or materials, and the adjustment of the tool to the task require exercise of considerable judgment.

2 Operating-Controlling: Starting, stopping, controlling, and adjusting the progress of machines or equipment designed to fabricate and/or process objects or materials. Operating machines involves setting up the machine and adjusting the machine or material as the work progresses. Controlling equipment involves observing gages, dials, etc. and turning valves and other devices to control such factors as temperature, pressure, flow of liquids, speed of pumps, and reactions of materials. Set up involves several variables and adjustment is more frequent than in tending.

3 Driving-Operating: Starting, stopping, and controlling the actions of machines or equipment for which a course must be steered, or which must be guided, in order to fabricate, process, and /or move things or people. Involves such activities as observing gages and dials; estimating distances and determining speed and direction of other objects; turning cranks and wheels; pushing clutches or brakes; and pushing or pulling gear lifts or levers. Includes such machines as cranes, conveyor systems, tractors, furnace charging machines, paving machines, and hoisting machines. Excludes manually powered machines, such as handtrucks and dollies, and power assisted machines, such as electric wheelbarrows and handtrucks.

4 Manipulating: Using body members, tools, or special devices to work, guide, or place objects or materials. Involves some latitude for judgment with regard to precision attained and selecting appropriate tool, object, or material, although this is readily manifest.

5 Tending: Starting, stopping, and observing the functioning of machines and equipment. Involves adjusting materials or controls of the machine, such as changing guides, adjusting timers and temperature gages, turning valves to allow flow of materials, and flipping switches in response to lights. Little judgment is involved in making these adjustments.

6 Feeding-Offbearing: Inserting, throwing, dumping, or placing materials in or removing them from machines or equipment which are automatic or tended or operated by other workers.

7 Handling: Using body members, handtools, and/or special devices to work, move, or carry objects or materials. Involves little or no latitude for judgment with regard to attainment of standards or in selecting appropriate tool, object, or material.

WORKER TRAITS

The problem of meeting the demands of an expanding economy and at the same time developing or otherwise providing job opportunities for the less than fully qualified applicant requires an understanding of the worker characteristics and abilities that contribute to successful performance on the job. These items are identified as worker traits, and for purposes of job analysis are defined by the following components: general educational development, aptitudes, interests, temperaments, physical capacities, and adaptability to environmental conditions. These are basic to the analysis of all job tasks and the requirements they make on the worker.

Scale of General Educational Development

Level	Reasoning Development	Mathematical Development	Language Development
6	Apply principles of logical or scientific thinking to a wide range of intellectual and practical problems. Deal with nonverbal symbolism (formulas, scientific equations, graphs, musical notes, etc.) in its most difficult phases. Deal with a variety of abstract and concrete variables. Apprehend the most abstruse classes of concepts.	Advanced calculus: Work with limits, continuity, real number system, mean value theorems, implicit function theorems. Modern algebra: Apply fundamental concepts of theories of groups, rings, and fields. Work with differential equations, linear algebra, infinite series, advanced operational methods, functions of real and complex variables. Statistics: Work with mathematical statistics, mathematical probability and applications, experimental design, statistical inference, econometrics.	Reading: Read literature, book and play reviews, scientific and technical journals, abstracts, financial reports, and legal documents. Writing: Write novels, plays, editorials, journals, speeches, manuals, critiques, poetry, and songs. Speaking: Conversant in the theory, principles, and methods of effective and persuasive speaking, voice and diction, phonetics, and discussion and debate.
5	Apply principles of logical or scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of technical instructions in books, manuals, and mathematical or diagrammatic form. Deal with several abstract and concrete variables.	Algebra: Work with exponents and logarithms, linear equations, quadratic equations, mathematical induction and binomial theorem, permutations. Calculus: Apply concepts of analytic geometry, differentiations and integration of algebraic functions with applications. Statistics: Apply mathematical operations to frequency distributions, reliability and validity of tests, normal curve, analysis of variance, correlation techniques, chi-square application and sampling theory, factor analysis.	Same as level 6
4	Apply principles of rational systems[1] to solve practical problems and deal with a variety of concrete variables in situations where only limited standardization exists. Interpret a variety of instructions furnished in written, oral, diagrammatic, or schedule form.	Algebra: Deal with system of real numbers; linear, quadratic, rational, exponential, logarithmic, angle and circular functions, inverse function; related algebraic solution of equations and inequalities; limits and continuity, probability and statistical inference. Geometry: Deductive axiomatic geometry, plane and solid, using properties of real numbers; use of rectangular coordinates. Shop Math: Practical application of fractions, percentages, ratio and proportion, measuration, logarithms, slide rule, algebra, geometric construction, es sentials of trigonometry.	Reading: Read novels, poems, newspapers, periodicals, journals, manuals, dictionaries, thesauruses, and encyclopedias. Writing: Business letters, expositions, summaries, reports, using prescribed format and conforming to all rules of punctuation, grammar, diction, and style. Speaking: Participate in panel discussions, dramatizations, and debates. Speak extemporaneously on a variety of subjects.

[1]**Examples of rational systems are: Bookkeeping, internal combustion engines, electric wiring systems, housebuilding, nursing, farm management.**

GED Scale (Continued)

Level	Reasoning Development	Mathematical Development	Language Development
3	Apply common sense understanding to carry out instructions furnished in written, oral, or diagrammatic form. Deal with problems involving several concrete variables in or from standardized situations.	Compute discount, interest, profit and loss, commission, markup, and selling price, ratio and proportion, and percentage. Calculate surfaces, volumes, weights and measures. Algebra: Calculate variables and formulas, monomials and polynomials, ratio and proportion variables, square roots and radicals. Geometry: Calculate plane and solid figures, circumference and area, volume. Understand kinds of angles, and properties of pairs of angles.	Reading: Read a variety of novels, magazines, atlases, and encyclopedias. Read safety rules, instruction in the use and maintenance of shop tools and equipment, methods and procedures in mechanical drawing and layout work. Writing: Write reports and essays in proper format, punctuation, spelling, grammar, using all parts of speech. Speaking: Speak before an audience with poise, voice control, and confidence, using correct English and well-modulated voice.
2	Apply common sense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.	Add, subtract, multiply, and divide all units of measure. Perform the four operations with like common and decimal fractions. Draw and interpret bar graphs. Perform arithmetic operations involving all American monetary units.	Reading: Passive vocabulary of 5,000-6,000 words. Read at rate of 190-215 words per minute. Read adventure stories, comic books, looking up unfamiliar words in dictionary for meaning, spelling, and pronunciation. Read instructions for assembly of model cars and airplanes. Writing: Write compound and complex sentences, using cursive style, proper end punctuation, and employing adjectives and adverbs. Speaking: Speak clearly and distinctly with appropriate pauses and emphasis, correct pronunciation, variations in word order, and using present, perfect, and future tenses.
1	Apply common sense understanding to carry out simple one- or two-step instructions. Deal with standardized situations with occasional or no variables in or from these situations encountered on the job.	Add and subtract two-digit numbers. Multiply and divide 10's and 100's by 2, 3, 4, 5. Perform the four basic arithmetic operations with coins as part of a dollar. Perform operations with units such as cup, pint, quart; inch, foot, yard; ounce, pound.	Reading: Recognize meaning of 2,500 (two- or three-syllable) words. Read at rate of 95-120 words per minute. Compare similarities and differences between words and between series of numbers. Writing: Print simple sentences containing subject, verb, and object, and series of numbers, names, and addresses. Speaking: Speak simple sentences, using normal word order, and present and past tenses.

General Educational Development

General Educational Development (GED) embraces those aspects of education (formal and informal) which contribute to the worker's (a) reasoning development and ability to follow instructions, and (b) acquisition of "tool" knowledges, such as language and mathematical skills. It is education of a general nature which does not have a recognized, fairly specific, occupational objective. Ordinarily, such education is obtained in elementary school, high school, or college. It also derives from experience and individual study.

The GED scale which appears on the previous pages is composed of three divisions: Reasoning Development; Mathematical Development; and Language Development. Each division contains six levels, and each should be considered independently of the others in evaluating individual tasks.

Illustrations of tasks representing the various levels are listed below.

Reasoning Development

Level 6

Formulates hypotheses and experimental designs to investigate problems of growth, intelligence, learning, personality, and sensory processes.

Studies and classifies extinct cultures to determine their age and cultural identity.

Applies mathematical methods to solution of physical problems.

Level 5

Interviews persons with problems, such as personal and family maladjustment, lack of finances, unemployment, and physical and mental impairment, to determine nature and degree of problems. Secures information on physical, psychological, social, and other factors contributing to client's situation, and evaluates these and client's capacities. Counsels clients individually or in groups regarding plans for meeting needs and assists them to eliminate problems.

Studies clerical and statistical methods in commercial or industrial establishments to develop improved and standardized procedures.

Evaluates statistical and physical data supplied by engineering department regarding such considerations as vehicle count per mile, load capacity of pavement, feasibility of widening pavement, and projected traffic load in future.

Level 4

Prepares sketches showing locations of all wiring and equipment or follows diagrams or blueprints prepared by others.

Draws and letters charts, schedules, and graphs to illustrate specified data, such as wage trends, absenteeism, labor turnover, and employment needs, using drafting instruments such as ruling and lettering plans, T-squares, and straightedge.

Composes and types routine correspondence.

Level 3

Operates cord or cordless switchboard to provide answering service for clients. Greets caller and announces name or phone number of client. Records and delivers messages, furnishes information, accepts orders, and relays calls. Places telephone calls at request of client or to locate client in emergencies. Files messages.

Determines quantity and type of transportation needed to ship plant products.

Secures antenna in place with bracket and guy wire, observing insurance codes and local ordinances to protect installation from lightning and other hazards.

Level 2

Directs action of children and traffic at street intersections to insure safe crossing.

Assigns drycleaning machine and points out posted instructions regarding its operation to customers in self-service drycleaning establishment.

Level 1

Marks size, lot number, contents, or other identifying information or symbols on containers or directly on article by placing stencil on object and rubbing ink or paint brush across open lettering.

Covers drycleaned clothing and household articles with plastic bags. Sorts and hangs drycleaned articles on rail, according to route number of color or drycleaning ticket.

Places eggs in holders that carry them into machine where rotating brushes or water sprays remove residue.

Mathematical Development

Level 6

Establishes computational procedures for and methods of analyzing problems.

Prepares mathematical model of problem, applying principles of advanced calculus and differential equations.

Interprets celestial phenomena and relates research to basic scientific knowledge.

Level 5

Assembles electronic systems and components used in aircraft and missile production.
Maintains operation of general accounting system, using principles of accounting.
Analyzes test results, using statistical techniques.

Level 4

Calculates standard control tolerances for flat glass, using algebraic formulas.
Converts metric measurements of foreign manifests into pounds and cubic feet, using formulas and calculating machine.
Establishes reference points on plastic sheet and computes layout dimensions, following blueprints.

Level 3

Computes cost of rental, based on per-day and per-mile rates.
Computes bill for items sold, using adding machine and cash register.
Calculates amounts of oil transferred to tank cars, using slide rule.

Level 2

Measures and marks carpeting and linoleum to get maximum number of usable pieces from standard-size rolls.
Weighs and measures specified quantities of ingredients of infant formulas, using scales, graduated measures, and spoons.
Collects cash for items sold and makes change.

Level 1

Cuts dried fabric into squares of specified size, using shears.
Measures size and length of skins on graduated board and separates skins according to size.
Counts novelty case parts to verify amount specified on work ticket.

Language Development

Level 6

Negotiates with department heads to establish policies and reach decisions affecting publications.
Examines legal data to determine advisability of defending or prosecuting lawsuit.
Reviews current literature in field of study.

Level 5

Reads news flashes and advertising copies during broadcasts.
Teaches enunciation of words, intonation, gestures, and other disciplines of voice and delivery.
Reviews agreement for conformity to company rates, rules, and regulations.

Level 4

Composes letters in reply to correspondence concerning requests for merchandise.
Interviews applicants to obtain information.
Inspects storage batteries in process of manufacture to verify conformity with specifications.

Level 3

Types letters from rough draft or corrected copy.
Greets passengers and answers questions about train schedules, travel routes, and railway services.

Level 2

Announces availability of seats and starting time of show.
Delivers packages to offices or departments within establishment, using handtruck.
Presents menu, answers questions, and makes suggestions regarding food and services.

Level 1

Delivers telephone directories to business establishments.
Obtains reels of motion picture film from stock.
Packs whiskey bottles in cartons.

Aptitudes

Aptitudes are defined as the specific abilities required of an individual in order to facilitate the learning of some task or job duty. Eleven such aptitudes have been identified, through extensive research, to be important in assessing the requirements of individuals to learn or adequately perform a job task. A list of these 11 aptitudes, their definitions, and guides for rating the individual aptitudes follow.

Aptitude Definitions

G INTELLIGENCE: General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school.

V VERBAL: Ability to understand meanings of words and ideas associated with them, and to use them effectively. To comprehend language, to understand relationships between words, and to understand meanings of whole sentences and paragraphs. To present information or ideas clearly.

N NUMERICAL: Ability to perform arithmetic operations quickly and accurately.

S SPATIAL: Ability to comprehend forms in space and understand relationships of plane and solid objects. May be used in such tasks as blueprint reading and in solving geometry problems. Frequently described as the ability to "visualize" objects of two or three dimensions, or to think visually of geometric forms.

P FORM PERCEPTION: Ability to perceive pertinent detail in objects or in pictorial or graphic material; to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines.

Q CLERICAL PERCEPTION: Ability to perceive pertinent detail in verbal or tabular material. To observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation.

K MOTOR COORDINATION: Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and quickly.

F FINGER DEXTERITY: Ability to move the fingers and manipulate small objects with the fingers rapidly or accurately.

M MANUAL DEXTERITY: Ability to move the hands easily and skillfully. To work with the hands in placing and turning motions.

E EYE-HAND-FOOT COORDINATION: Ability to move the hand and foot coordinately with each other in accordance with visual stimuli.

C COLOR DISCRIMINATION: Ability to perceive or recognize similarities or differences in colors, or in shades or other values of the same color; to identify a particular color, or to recognize harmonious or contrasting color combinations, or to match colors accurately.

For job restructuring purposes the analyst must determine which aptitudes are important in the performance of each task. To make this determination he must first evaluate each job task in terms of all 11 aptitudes. After evaluating all aptitudes, the analyst must determine which of these are important for task performance.

Certain aptitudes can be identified through the actions which the worker performs to carry out the job task. Among them are: motor coordination, finger dexterity, manual dexterity, and eye-hand-foot coordination. Spatial, numerical, verbal,and intelligence aptitudes are indicated by the communications, decisions, visualizations, and other interpersonal relationships with which the worker is involved.

Since job tasks involve a relationship to data, people, and things, the following may be useful in determining which aptitudes are important to a particular task:

Data relationships typically involve combinations of intelligence, verbal, numerical, and clerical aptitudes.

Spatial and form perception aptitudes are frequently important to data-things relationships.

In tasks relating to people, other traits are frequently more typical or important than aptitudes. However, intelligence and verbal aptitudes are required to some degree.

Tasks relating to things involve finger and manual dexterity, motor coordination, and eye-hand-foot coordination, or some combination of these aptitudes. Form perception is characteristically involved in the inspection of things.

After determining which aptitudes are important, the analyst must then estimate the level of those aptitudes required for performance of each task. The levels are on a scale of 1 to 5 and are in terms of equivalent amounts possessed by segments of the general working population.

In estimating aptitude levels, the analyst should use as his basic criteria the Aptitude Definitions and the Aptitude Benchmarks (illustrative situations) that follow. Cite the average rather than the maximum or minimum requirements.

In summary, the aptitude rating procedure involves these steps:

1. Evaluate each task in terms of all 11 aptitudes.
2. Determine which of the aptitudes are important to the performance of the task.
3. Estimate what level of the aptitudes that have been determined to be important are required for the successful (average) performance of the task.

Aptitude Benchmarks

The benchmarks for the levels of aptitude on the following pages are in terms of situations selected to represent broad occupational categories such as professional, technical, managerial, clerical, sales, services, craftsmen, foremen, operators, and laborers, and to indicate involvement with data, people, and things.

The application of the aptitude in the task is presented in specific terms in the benchmark rather than leaving this to be inferred from the situational description. This was given special emphasis for the cognitive aptitudes (intelligence, verbal, numerical, spatial, form perception, clerical perception, and color discrimination), which are often difficult to rate because one cannot "see" the worker utilizing these capacities on the job. However, in instances where the application of the aptitude is explicit in the description, no attempt was made at further explanation.

Each benchmark is introduced with a task statement and supplementary descriptive material where necessary to orient the reader to the job-worker situation. Some of the aptitude definitions are followed by comments which have been added to further explain the aptitude and to assist in evaluating the tasks.

APTITUDE G–INTELLIGENCE

General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school.

Level 1

Conducts research in application of mathematical techniques to management.

Intelligence is required to understand meanings and relationships of mathematical symbols, formulas, and concepts; to assimilate background information required to understand problems from various fields; to develop or apply appropriate methods and procedures for solving problems; and to present solutions or methodologies for solution in logical and systematic forms and sequences.

Treats malformations of teeth and gums.

Intelligence is required to understand and apply principles of dental anatomy, bacteriology, and physiology for diagnosis and treatment, and to use techniques of dental restoration and prosthetics. Must understand the operation and function of dental tools and equipment, and the uses of dental metals, alloys, and amalgams.

Coordinates activities of control room personnel to insure technical quality of pictures.

Plans and arranges for all audio, visual, and special effects equipment and technical personnel needed for programs using judgment to determine number of cameras, etc., necessary to achieve specified effects. Gives work assignments to technicians who control and maintain lights, audio and visual controlling equipment, microphones, and cameras. Must understand functions and capabilities of equipment to give directions

Level 2

Executes administrative policies through subordinate managers.

Intelligence is required to learn and understand the overall techniques and problems in the field of management including some knowledge of the various specializations, such as production, marketing, personnel, and finance, and their application to the specific industry and firm involved; and to analyze management problems and make judgments.

Teaches students in mathematics.

Intelligence is required to learn teaching methods and the subject matter for the curriculum taught; to determine the difficulty level of subject matter relative to the students; to plan presentations of subject matter and prepare tests; to assist pupils through various teaching methods; and to evaluate their progress.

Repairs radios and television receivers, using handtools and electronic testing instruments.

Intelligence is required to learn basic radio and TV theory, circuitry, and use of test instruments; to analyze operational symptoms in determining nature of faults in radio and television sets; and to make necessary repairs.

Level 3

Cares for handicapped persons in hospitals.

Intelligence is required to learn and apply principles and techniques of basic nursing skills, body structure and functions, personal hygiene, nutrition, and first aid; and to use judgment in patient care, moving patients, and giving prescribed medicines and injections.

Transcribes dictated material, using typewriter.

Intelligence is required to learn meaning and usage of shorthand symbols, to learn typewriter operation and memorize keyboard, to learn rules for format of business letters and reports and rules of spelling, punctuation, and grammar.

Repairs knitting machines, using knowledge of machine functions.

Intelligence is required to learn the principles of how a knitting machine functions and is controlled and how to set up from pattern design charts. Must use judgment and apply knowledge of machine function to determine causes of malfunctions by observing machine output or operation. Must understand written and oral instructions to make repairs.

Level 4

Tends machine that knits garment parts.

Intelligence is required to learn operation of machine, including adjustment of guides and tension rollers to obtain length, width, and mesh specifications; how to thread yarn through guides, tension springs, etc.; and replacement of defective needles.

Assists in care of hospital patients, under direction of nurse.

Intelligence is required to learn patient care and handling and hospital routine; to understand and carry out orders correctly; to use reason and judgment in handling patients, noting patients' conditions and reporting symptoms or reactions which may indicate a change in condition.

Drives gasoline-powered industrial truck to lift bulk materials in warehouse.

Intelligence is required to understand oral instructions from foreman concerning materials to be moved, their location and destination, and how they are to be stacked or stored. Uses judgment to determine if vehicle is operating efficiently and to resolve job problems.

Level 5

No benchmarks.

APTITUDE V–VERBAL APTITUDE

The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words, and to understand meanings of whole sentences and paragraphs.

Level 1

Devises processes for manufacturing chemicals and chemical products.
Verbal aptitude is required to acquire the technical vocabulary of chemistry and engineering in order to read and understand reference materials and to write technical reports and design or production specifications.
Directs editorial activities of newspaper.
Verbal aptitude is necessary to write lead or policy editorials explaining complex political, social, or other issues in language which will be understood by most readers; to interpret the editorial policy of the firm on specific issues to other editorial writers; and to speak at professional and community functions as a representative of the publisher.
Analyzes occupational data concerning jobs.
Verbal aptitude is required to read, understand, and interpret various kinds of technical data; to write reports, letters, and job descriptions concisely and clearly; and to conduct information gathering interviews.

Level 2

Instructs students in mathematics.
Verbal aptitude is required to read and understand textbooks or other literature related to the subject matter taught; to lecture on, discuss, and explain subject matter to convey information to students; to write lesson plans and outlines; and to read students' papers and write critiques.
Operates small-scale reactor to test methods and chemical processes for product development.
Verbal aptitude is required to understand chemical terminology, to read and understand specifications for chemical processes, and to write reports of test procedures and results.
Conducts reception interview of applicants to route them to correct departments.
Verbal aptitude is required to question applicants to determine their needs; give explanations regarding employment office services; and give instructions for completing forms or for other actions applicants must take.

Level 3

Types letters from rough draft or correct copy.
Verbal aptitude is required to understand the meaning of words, sentences, and whole paragraphs well enough so that in copying from a rough draft the typist can detect insertions that are out of context or incorrectly placed, and interpret the sequence of corrections which may be badly placed by the person making changes in the rough draft.
Describes selling features to customer and advises customer in making selection by explaining use of a particular article or suggesting other articles.
Discusses nature and extent of damage and repairs needed with customer and service manager.

Level 4

Tends machines that knit garment parts.
Reads knitting ticket for each machine to find out amount to be knitted, style, size, part, dimensions, yarn type, color, and dye lot number. Takes test piece of material being knitted to next department for processing and receives any instructions for adjustment of machine to obtain desired quality. Records production records for day and reports any unusual problems encountered.
Reads production orders to determine number and kind of bakery products to make.
Cares for children in private home.

Level 5

No benchmarks.

APTITUDE N–NUMERICAL APTITUDE

The ability to perform arithmetic operations quickly and accurately.

Level 1

Analyzes cost analysis systems to refine their formulation for application to electronic data processing equipment.
Numerical aptitude is required to understand and use mathematical principles to compute estimated cost, time, equipment, and personnel required to solve problem.
Designs industrial machinery and equipment. Numerical aptitude is required to use analytical geometry, calculus, and differential equations to apply fundamentals of mechanical engineering to machine and tool design.
Reviews applications for casualty insurance following company's underwriting policies.
Determines amount of risk company will insure, based on value of property and risks involved, and the premium thereon. Determines the value of each factor affecting the degree of risk and applies the applicable premium to each using rate tables or computes the weighted value of each factor to arrive at a final composite weight used to compute the premium. Computes amount of insurance in force in the particular class of risk or in the same area to assure that the company is spreading its risks sufficiently according to probability tables for the specific incidents insured against.

Level 2

Maintains operation of general accounting system. Applies numerical reasoning to design or modify systems to provide records of assets, liabilities, and financial transactions. Applies arithmetic principles to prepare accounts and records and reports based on them; to audit contracts, orders, and vouchers; and to prepare tax returns and other reports to government agencies.

Repairs radar systems using handtools and test instruments. Numerical aptitude is required to calculate dimension; to determine output measurements of components; to compute ratios when calibrating instruments; and to apply principles of geometry and trigonometry to compute angles and coordinates.
Records financial transactions of establishment using bookkeeping machine. Numerical aptitude is required to record individual entries for each transaction and post totals, net amounts, and other computations. Verifies entries and summarizes and balances totals to insure accuracy. Prepares periodic trial balances and other statistical information.

Level 3

Treats patients with back injuries to relieve pain. Numerical aptitude is required to interpret clinical tests such as range of motion, muscle response, and functional tests to ascertain extent of physical loss; to determine intensity and duration of manual or mechanical therapy treatment or procedures such as weight lifting, diathermy, traction, or electrotherapy.
Sells tickets for airlines. Computes ticket cost and taxes, using schedules and rate books. Checks and weighs baggage, computes travel time and fares for different types of accommodations. Prepares daily sales record showing number and class of tickets sold, amount of fare, and taxes. Counts and balances cash with sales record.
Operates machine tools to make or repair parts. Requires the application of shop mathematics including geometry and trigonometric functions, to lay out work pieces, position and set up work piece, set up machine tools, and measure work piece for conformance to standards.

Level 4

Repairs machine using knowledge of machine function.
Mixes ingredients according to recipes. Numerical aptitude is required to calculate quantities and proportions of ingredients based on master recipes and for the measurement of temperatures, time, and weights.
Records weight of materials.

Level 5

No benchmarks.

APTITUDE S–SPATIAL APTITUDE

Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space.

Level 1

Treats malformation of teeth and gums. Spatial aptitude is required to read X-rays; to comprehend the relation between teeth, tooth functions, tooth forms, stresses, and all phases of occlusion.
Conducts research in application of mathematical techniques to management.
Spatial aptitude is required to visualize and understand the spatial relationships of objects and forces involved in a situation and their resultant effects on each other.
Designs private residences. Plans layout of project, using visual imagination to integrate structural, mechanical, and ornamental elements into a unified design. Prepares sketches and elevation view of project for client. Prepares scale and full-size drawings for use of building contractors and craftsmen.

Level 2

Adjusts radios and television receivers, using handtools and electronic testing instruments.
Spatial aptitude is required to read circuit diagrams to assemble and repair radio and television set components; to visualize the power flow and the spatial relationship of components and circuits as they relate to various functions to isolate them for testing and to test each circuit serially; and to visualize the source of trouble from observation of picture or from sound.
Controls air traffic within vicinity of airport. Spatial aptitude is required to observe the spatial relationships of aircraft within the immediate vicinity of the airport and to visualize the relative positions of other aircraft from radar and time, distance, speed, and altitude information.

Level 3

Treats patients with back injuries to relieve pain. Spatial aptitude is required to visualize anatomic positions and the relationship between the point of application of forces and the area affected (as in traction); and to place treatment devices or administer manual treatment in relationship to the affected body part.
Installs structures of wood using carpenter's handtools and power tools.
Spatial aptitude is required to interpret blueprints and visualize the three-dimensional form of the structure from prints, to lay out workpieces from blueprints, to shape and fit parts, and to construct forms for pouring concrete.
Repairs upholstered furniture, using handtools and knowledge of fabrics and upholstery methods.
Spatial aptitude is required to visualize a completed furniture piece when positioning and fitting spring assembly units and padding.
Repairs looms to weave cloth of specified quality and design, using knowledge of loom function and weaving diagrams.
Spatial aptitude is required to set up loom, positioning warp beam, harness, drop wire, and reed to weave specified pattern;and to check loom in operation to see that operating parts are synchronized.

Level 4

Determines grade and contours from construction drawings needed to form or guide forming of work to specified shape.

Drives gasoline-powered industrial truck equipped with forklift, to lift bulk materials in warehouse.

Observes changing position of fork in relation to objects or materials to maneuver fork under load; must observe position of load relative to other object to move load about and to position or stack load.

Level 5

No benchmarks.

APTITUDE P–FORM PERCEPTION

Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shading of figures and widths and lengths of lines.

Level 1

Conducts studies of all nonmetallic minerals used in horological industry.

Is able to perceive detail of grain size, pattern, and crystalline orientation in diamonds and abrasives and see differences in the features and size of grain angles using optical, X-ray, and other precision instruments.

Performs microscopic tests to provide data for use in treatment and diagnosis of disease.

Form perception is required to perceive pertinent details of shape, shade, and other characteristics when examining or comparing specimens or cultures under microscope.

Level 2

Diagnoses diseases and disorders of animals

Form perception is required to perceive pertinent details of size, shape, and form in skeletal structure, organs, tissue, and specimens of various animals.

Takes dictation of correspondence in shorthand.

Recognizes shorthand symbols.

Lays brick to construct or repair walls.

Form perception is required to cut bricks to required shape; to lay window sill bricks at proper angle; to aline bricks on a level plane and with a uniform thickness of mortar between each joint; and to shape mortar after bricks are in place to achieve a specified joint shape such as flat, concave, convex, or v-shaped.

Level 3

Repairs calculating machines using handtools.

Form perception is required to identify machine parts, and to detect defects in parts by their shape and alinement with other parts when determining type and extent of repairs or service needed.

Covers interior walls and ceilings of rooms with decorative wallpaper or fabric.

Observes details of pattern in paper and cuts successive strips so pattern continuity is maintained (or breaks are not discernible) throughout room(s). Maintains square alinement of paper during application and observes details of pattern to match adjacent edges of successive strips. Notes appearance of paste to determine when it is mixed to desired consistency. Discerns when walls are clean enough to receive new paper and able to see small holes, indentations, or projections which could affect the appearance of the wall when paper is applied.

Verifies accuracy of calculations pertaining to business transactions recorded by other workers.

Form perception is required to quickly locate forms by their size, shape, and layout; and to go directly to part of form where necessary information is located by examination of page layout.

Level 4

Performs repetitive line assembly operations to produce refrigerators.

Form perception is required when buffing parts to see when burrs are buffed from ends of tubing and proper taper is attained; and to see small bubbles rise to surface of test tank denoting leak in coil, and to locate their source.

Issues equipment in stockroom.

Examines stock to identify item according to size, shape, or other characteristics in order to verify its conformance to requisitions or invoice specifications.

Welds metal parts together, as specified by layout, diagrams; work order, or oral instructions.

Form perception is required to see details in work diagrams; to aline workpiece according to layout markings; to follow line to be welded; to guide torch; and to inspect weld bead for consistent size, straightness, and complete fill of joint.

Level 5

No benchmarks.

APTITUDE Q–CLERICAL PERCEPTION

Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation.

Level 1

Conducts research in application of mathematical techniques to management.

Accurately perceives numbers when performing computations, applying methods of numerical analysis and operating calculators, plotters, or other electrical computation machines in solving problems in support of

mathematical, scientific, or industrial research activity; and when analyzing tabular material produced as part of such research.

Reads and corrects proof while original copy is read aloud.

Clerical perception is required to see details in proof pages such as the way words are spelled, capitalized, hyphenated, and abbreviated; and to detect typographical and other errors, such as misspelling, wrong punctuation, skips, or repeats.

Converts symbolic statement of business problems to detailed logical flow charts for coding into computer language.

Clerical perception is required to perceive pertinent detail in program documentation, assembled data, and recommended program routines; to prepare input, output, and nomenclature lists; and to translate step-by-step instructions from flow chart for the console operator. Required to recognize and detect errors in program instructions, to correct errors by altering sequence of steps, and to avoid perceptual errors in making computations.

Level 2

Reviews individual applications for insurance following company's underwriting policies.

Avoids perceptual errors in computations when determining value of property and risk involved; and when figuring premiums using tables and weighted values for risk factors. Notes pertinent details in insurance applications and investigation reports. Accurately reads tables and insurance maps (showing amount and type of insurance in force in specific areas).

Performs bacteriologic tests to provide data for use in treatment and diagnosis of disease.

Clerical perception is required to read laboratory test request slips, to determine patient for whom tests are to be made, type of test, quantities and types of specimens to be taken, and special test instructions. Reads words and chemical symbols on laboratory supplies to select exact chemical for use in tests. Reads reference materials to determine type and quantities of reagents to use in analysis. Accurately perceives numbers when performing arithmetic computations for quantitative analyses. Accurately perceives words and numbers to file test reports, specimens, and other records, according to alphabetical and numerical systems.

Level 3

Maintains machinery of industrial establishments in accordance with blueprints, manuals, and building codes, using handtools.

Accurately perceives numbers when reading blueprints and wiring diagrams to determine dimensions, size, or value of components to be repaired or replaced, when reading scales, meters, gages, or other measuring instruments, and when computing values, sizes, or dimensions.

Drives truck over established route to deliver products. Clerical perception is required to fill out requisitions for merchandise and to check amounts received against requisition; to prepare sales slips for amounts sold, entering proper amount beside item listed on sales slip; and to avoid perceptual errors when computing total of sales and preparing reports of daily sales and collections.

Operates cash register to compute and record total sale. Must accurately record amount of sale on cash register, compare sales slip with price tickets on merchandise, and copy cash register totals onto daily sales and receipt records.

Level 4

Operates machine tools applying knowledge of mechanics, shop mathematics, metal properties, and layout machining procedures.

Clerical perception is required to note dimensional details in blueprints; to read measuring instrument and gages or indicators on machines; and to avoid perceptual errors when computing dimensions, locating reference points, and using tables.

Inspects finished glassware for conformance to quality standards.

Clerical perception is required to accurately read micrometers and gages to determine if dimensions are within specified tolerances and to record number and types of defects.

Drives gasoline-powered industrial truck equipped with forklift to lift bulk materials in warehouse.

Accurately perceives identification numbers and weights marked on materials, packing cases or tote boxes to identify materials to be moved and to assure that weight of items lifted does not exceed vehicle capacity.

Level 5

No benchmarks.

APTITUDE K–MOTOR COORDINATION

Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly.

Level 1

No benchmarks.

Level 2

Types letters from rough draft or corrected copy.

Typing is performed by "touch," the fingers striking the appropriate keys as the eyes follow the copy.

Renders general nursing care to patients in hospital.

Coordinates vision and finger and hand movements to give injections with hypodermic needle, give medication, position or remove dressings, and measure medicines.

Installs pneumatic, electrical, and electronic instruments.
Motor coordination is required in using handtools to adjust or repair component parts of electronic instruments, to test and calibrate reassembled equipment with electrical testing devices, and to rewire and modify equipment in accordance with blueprints and schematics.

Level 3

Performs beauty services for patrons of beauty shop.
Required to coordinate eyes, hands, and fingers to cut, style, and tint hair; give facials; arch eyebrows; and manicure nails.
Operates machine to cast complete lines of type from type metal.
Concentrated visual attention is required to direct the fingers and hands in adjusting marginal stops and gages to regulate length and thickness of lines to be cast.
Reads copy and presses keys of keyboard to select matrices of letters from magazine.
Compiles statistical information on topics such as public issues and consumer buying habits.
Eye-hand coordination is needed to record data on standard forms or in notebooks.

Level 4

Rebinds cleaned blankets by hand.
Eye and finger coordination is required in sewing, darning, or reweaving holes or tears in garments, curtains, or linens.
Marks for correction any grammatical, typographical, or compositional errors.
Required to coordinate eyes and fingers in making proofreader's marks.
Operates machine tools to make or repair metal parts.
Motor coordination is required to properly aline workpiece and cutting tool in relation to one another; to move levers when operating machines; and in using handtools to perform such functions as chipping, filing, and scraping.

Level 5

No benchmarks.

APTITUDE F–FINGER DEXTERITY

Ability to move the fingers, and manipulate small objects with the fingers rapidly or accurately.

Level 1

Plays organ in recital.
All ten fingers must be positioned in rapid integrated movements to depress specified keys at varying tempos on one or more keyboards of an organ.
Performs surgical operations upon human body.
Finger movements of one hand are required to locate broken or cut blood vessel, to position vessel and place ligature about it, and to tie one of several types of knots in ligature to stem flow of blood from vessel.

Level 2

Proofs records of bank transactions using proof machine.
Controlled finger movements are required to operate keyboard of proof machine in order to sort items into various categories and list them on master control and individual batch tapes.
Installs optical elements in mechanical portion of cameras.
Finger dexterity is required to guide and move tools and to position component parts in performing such tasks as scraping, filing, and lapping instrument mounts to aline optical elements; adjusting optical elements so calibrations read correctly; and inserting retaining rings into housings and securing them to posts or threads.
Entertains audience by performing sleight-of-hand tricks.
Finger movements are required in performing tricks that involve picking specific cards out of a deck; pulling objects from sleeve, jacket, or hat; and removing objects, such as watches and wallets, from members of audience without their knowledge.

Level 3

Transcribes dictated materials, using typewriter.
Finger dexterity is required in depressing keys of typewriter.
Cuts hair using clippers, comb, and scissors.
Controlled movements of fingers are required to use clippers, scissors, and other barber tools when cutting hair.
Operates loom to weave yarn into cloth.
Finger dexterity is required to repair breaks in warp fiber by tying piece of yarn to broken end of warp and threading yarn through drop wires, heddle eyes, and reed dents, using reed hooks.

Level 4

Prepares foodstuffs for consumption in medical institutions.
Finger action is required in using knives, brushes, scrapers, and other tools to clean, trim, slice, and dice vegetables, fruits, and meats; in portioning food; in turning dials and valves on kitchen equipment; in removing dishes, napkins, and waste materials from food carts; in sorting and stacking dishes; and in lining pans and shelves with paper.
Sews fasteners and decorative trimmings to articles using needle and thread.
Finger dexterity is required to thread needle, aline articles, and hold articles in place while sewing.
Interviews job applicants in employment agency.
Finger dexterity is required to perform such tasks as searching applicant files to locate and take from file

applications of persons qualified for job openings; recording information taken from applicants and employers, using pencil, pen, and/or typewriter; and demonstrating aptitude tests, such as those for manual dexterity, finger dexterity, and motor coordination, before administering tests to applicants.

Level 5

No benchmarks.

APTITUDE M–MANUAL DEXTERITY

Ability to move hands easily and skillfully. To work with the hands in placing and turning motions.

Level 1

No benchmarks.

Level 2

Interprets music on violin to entertain audience. Coordinating the movement of both hands is essential. The right hand draws bow across strings while the left hand is bent to allow the fingers to manipulate proper strings so as to produce the desired sounds and tones. Wrists of both hands must be flexible.

Installs recording instruments using handtools and precision instruments.

Assembly, disassembly, and calibration of instruments require placing and turning movements of the hands. Works with handtools such as screwdrivers, wrenches, and pliers and bench tools such as jeweler's lathe, pin vises, small buffer grinders, and ultrasonic cleaners in installing of instruments.

Services automotive vehicles with fuel. Manual dexterity is required to manipulate hose while pumping gas.

Level 3

Distributes letter mail in racks. Rapidly picks up faced mail from ledge in left hand. Grasps single letter in right hand, notes address and places in proper slot in rack. Repeats until batch is sorted.

Repairs looms to weave cloth. A variety of hand and wrist movements is required to adjust screws and levers, install gears, tighten bolts, and repair and replace various mechanical parts of the machine.

Renders general nursing care to patients in hospital. Manual dexterity is required to move, transport, lift, turn, position, dress, and otherwise handle patients; to make beds, push food carts, and perform general cleaning tasks; to handle equipment and instruments; and to store supplies in designated places in stockroom.

Level 4

Maintains physical structures of commercial and industrial establishments using hand and power tools.

Manual dexterity is required in all phases of repair and maintenance of the physical structure of buildings. Repairs and maintains woodwork and furniture, makes electrical repairs, patches and repairs cements, and makes minor plumbing and pipe repairs.

Maintains library collection of books, periodicals, documents, films, recordings, and other materials.

Manual dexterity is required in placing and removing books from shelf, inspecting books, and handling books during check out.

Teaches elementary school pupils manipulative skills. Manual dexterity is required to prepare outlines and correct tests and record results. Operates audio-visual teaching aids to present subject matter to class.

Level 5

No benchmarks.

APTITUDE E–EYE-HAND-FOOT COORDINATION

Ability to move the hand and foot coordinately with each other in accordance with visual stimuli (not measured by the General Aptitude Test Battery).

Level 1

Pilots experimental aircraft to determine their airworthiness. Coordinates hand and foot controls in accordance with information indicated by instrument readings and observed conditions or objects near aircraft when taxiing aircraft to test controls, brakes, and shock absorbers and when maneuvering aircraft through stalls, dives, glides, rolls, turns, and speed runs to test and evaluate its stability, control characteristics, and aerodynamic design.

Instructs groups at playgrounds and schools in fundamentals and rules of competitive sports.

Coordination of hand and foot movements with visual stimuli is required to demonstrate, by example, the techniques of play for various sports and the movements and body positions which result in the best execution of a particular "play" or maneuver.

Interprets music on a drum to entertain audiences.

Eye-hand-foot coordination is required to hit or stroke drumheads with drumsticks or brushes and depress pedals to activate other drums and cymbals simultaneously, while following musical score and conductor's baton.

Level 2

Pilots airplane to transport passengers.

Coordinated movements of hand and foot controls in accordance with observed conditions of aircraft or external factors or conditions indicated by instrument readings are required to take over control of airplane in emergency or override programed control in case of a malfunction and to taxi, take off, land, and control aircraft in flight.

Positions structural-steel members to form completed structures or frameworks, working as a member of a crew.

Usually works above ground level, balancing on ladders, scaffolding, or structural members while raising, positioning, fitting, and joining structural pieces.
Wires radio-broadcasting and radio-communications antenna systems.
Climbs wood or steel antenna towers and balances self while wiring tower.

Level 3

Drives bus to transport passengers over specified routes according to time schedule.
Uses hands, arms, and feet simultaneously to move levers, pedals, and steering wheel to control the movement of the bus on highways and in city traffic.
Maintains mercury-vapor, electric-arc, fluorescent, or incandescent street lights or traffic signals.
Climbs ladder to reach lamp or stand in tower-truck bucket and move levers to position bucket near lamp. Maintains balance while using hands and vision to test circuits, locate broken wires, and replace fuses, bulbs, and transformers.
Renders personal services conducive to safety and comfort of airline passengers during flight.
Coordinates hand and foot movements with vision to serve food and beverages without spilling them; to walk in aisle when airplane encounters rough weather, carrying trays or other items.

Level 4

Transcribes letters using a transcribing (voice-reproducing) machine and typewriter.
Coordinates hand and finger movements required to operate typewriter and foot to start and stop transcriber with typed copy to control length of lines and positioning and spacing of copy.
Operates pressing machine to smooth surfaces, flatten seams, or shape articles.
Eye-hand-foot coordination is required to simultaneously step on foot pedal and pull down on pressing head while observing garment to see that it does not slip out of position on press buck. Holds down pedal with foot to keep press head against garment and presses lever with fingers to emit steam from press head. Keeps pressure on press head handle to raise counterbalanced head gently, while stepping on second pedal to exhaust steam, cooling and drying garment.
Instructs novices and players who wish to improve their skill in playing golf.
Coordinates movements of hands and arms with legs and feet and vision to demonstrate the proper grip, stance, and swing to use with the various clubs and ball positions on the field of play.

Level 5

No benchmarks.

APTITUDE C–COLOR DISCRIMINATION

The ability to match or discriminate between colors in terms of hue, saturation, and brilliance. To identify a particular color or color combination from memory and be able to perceive harmonious or contrasting color combinations.

Saturation: Refers to the purity of color. Some colors have greater purity or amount of a certain color than others; that is, they have a more pronounced hue. For example, deep red is more "reddish" than light red.

Hue: Refers to the color itself and is dependent upon the dominant wavelength in any spectral energy distribution. It is this quality that differentiates "blues," "greens," "reds," etc.

Brilliance: Refers to the brightness of a color. It is the amount of light reflected from a surface and can range from high to low as, for example, from a white snowflake to a mark made by a lead pencil.

Color matching: Varying the components of a color mixture until it does not differ visually from a given sample.

Color memory: Is the ability to retain an accurate visual image of a color and be able to use it as a basis for matching and discriminating.

Level 1

Develops color formulas for printing textile and plastic materials.
Color discrimination is required to select and combine appropriate dyestuffs and pigments to achieve desired colors. Is able to distinguish minute differences in shades and must have the capacity to visualize the hue and brilliance which will result from mixing the primary colors in various proportions.
Performs surgery to correct deformities. Uses color discrimination and color memory in making diagnosis of patient's affliction or condition. Must be able to recognize any deviations in color of diseased tissue from healthy tissue. Evaluates color characteristics such as hue and saturation of affected body parts and makes determination as to the extent or origin of the condition.
Reweaves damaged areas of oriental or other expensive rugs. Color discrimination is required to perceive color scheme of rug so that proper alterations can be made which are consonant with the rug's total color configuration. Color matching is essential to selecting yarn which is equivalent in color to that in the rug.

Level 2

Mixes stains, paints, and other coatings for use in painting according to formulas.
Color discrimination is required to detect any differences in color between mixture and sample to be

matched. If formula does not produce quite the desired shade, adds additional pigment, depending on his sense of color discrimination to produce exact shade.
Designs artistic interiors for homes. Is well informed on the outcome of blending various colors in interior decorating and capable of choosing color schemes which are harmonious with each other and the particular setting.
Studies effects of drugs on tissues and physiological processes of animals and human beings.
The resultant color shade and hue are used as a basis for drawing valid conclusions about the effect of the drug or stain. Moreover, color matching is required when preparing two solutions of equal concentration or proportion.

Level 3

Grades sample fruit from load at receiving point. Judges by the color of the peeling or exterior coating of the fruit its state of maturity (overripe, ripe, or not ripe).
Regulates gas and air supply to maintain specified temperature. Observes color of flame through opening of optical pyrometer and turns dial on pyrometer until color of wire filament matches luminosity of flames. This color matching technique requires the worker to be able to make discrimination in color between the flame and wire filament.
Repairs upholstered furniture, using handtools and knowledge of fabrics and upholstery methods.
Color discrimination is essential in distinguishing areas which require repairing and in selecting fabric which is equivalent in color characteristics to that already on furniture.

Level 4

Sorts fish according to coloring. Uses color discrimination and matching to sort fish according to size, coloring, and species in transferring them to proper tanks.
Arranges tiles into designs for use as floor or sink tops. Is able to discriminate between colors in order to insert individually colored tiles in slots following sample design.
Cuts meat to size for display. Is able to distinguish different shades and colors in selecting meats which meet customer's specifications and in inspecting meats for quality.

Level 5

No benchmarks.

Interests

Interests are defined as preferences for certain types of work activities or experiences, with accompanying rejection of contrary types of activities or experiences. Five pairs of interest factors are provided so that a positive preference for one factor of a pair also implies rejection of the other factor of that pair.

1	Situations involving a preference for activities dealing with things and objects.	vs. 6	Situations involving a preference for activities concerned with people and the communication of ideas.
2	Situations involving a preference for activities involving business contact with people.	vs. 7	Situations involving a preference for activities of a scientific and technical nature.
3	Situations involving a preference for activities of a routine, concrete, organized nature.	vs. 8	Situations involving a preference for activities of an abstract and creative nature.
4	Situations involving a preference for working for people for their presumed good, as in the social welfare sense, or for dealing with people and language in social situations.	vs. 9	Situations involving a preference for activities that are nonsocial in nature, and are carried on in relation to processes, machines, and techniques.
5	Situations involving a preference for activities resulting in prestige or the esteem of others.	vs. 0	Situations involving a preference for activities resulting in tangible, productive satisfaction.

Temperaments

Temperaments are defined in terms of the different types of occupational situations to which workers must adjust.

1 Situations involving a variety of duties often characterized by frequent change.
2 Situations involving repetitive or short cycle operations carried out according to set procedures or sequences.
3 Situations involving doing things only under specific instruction, allowing little or no room for independent action or judgment in working out job problems.
4 Situations involving the direction, control, and planning of an entire activity or the activities of others.
5 Situations involving the necessity of dealing with people in actual job duties beyond giving and receiving instructions.

6 Situations involving working alone and apart in physical isolation from others, although the activity may be integrated with that of others.

7 Situations involving influencing people in their opinions, attitudes, or judgments about ideas or things.

8 Situations involving performing adequately under stress when confronted with the critical or unexpected or when taking risks.

9 Situations involving the evaluation (arriving at generalizations, judgments, or decisions) of information against sensory or judgmental criteria.

0 Situations involving the evaluation (arriving at generalizations, judgments, or decisions) of information against measurable or verifiable criteria.

X Situations involving the interpretation of feelings, ideas, or facts in terms of personal viewpoint.

Y Situations involving the precise attainment of set limits, tolerances, or standards.

Physical Demands

Physical demands are those physical activities required of a worker in a job. The factors involved are:

1. LIFTING, CARRYING, PUSHING, AND/OR PULLING (STRENGTH): These are the primary "strength" physical requirements, and generally speaking, a person who engages in one of these activities can engage in all. Specifically, each of these activities can be described as:

Lifting: Raising or lowering an object from one level to another (includes upward pulling).

Carrying: Transporting an object, usually holding it in the hands or arms or on the shoulder.

Pushing: Exerting force upon an object so that the object moves away from the force (includes slapping, striking, kicking, and treadle actions).

Pulling: Exerting force upon an object so that the object moves toward the force (includes jerking).

The five degrees of the physical demands STRENGTH factor are as follows:

S Sedentary Work

Lifting 10 pounds maximum and occasionally lifting and/or carrying such articles as dockets, ledgers, and small tools. Although a sedentary job is defined as one which involves sitting, a certain amount of walking and standing are often necessary in carrying out job duties. Jobs are sedentary if walking and standing are required only occasionally and other sedentary criteria are met.

L Light Work

Lifting 20 pounds maximum with frequent lifting and/or carrying of objects weighing up to 10 pounds. Even though the weight lifted may be only a negligible amount, a job is in this category when it requires walking or standing to a significant degree, or when it involves sitting most of the time with a degree of pushing and pulling of arm and/or leg controls.

M Medium Work

Lifting 50 pounds maximum with frequent lifting and/or carrying of objects weighing up to 25 pounds.

H Heavy Work

Lifting 100 pounds maximum with frequent lifting and/or carrying of objects weighing up to 50 pounds.

V Very Heavy Work

Lifting objects in excess of 100 pounds with frequent lifting and/or carrying of objects weighing 50 pounds or more.

2. CLIMBING AND/OR BALANCING:

Climbing: Ascending or descending ladders, stairs, scaffolding, ramps, poles, ropes, and the like, using the feet and legs and/or hands and arms.

Balancing: Maintaining body equilibrium to prevent falling when walking, standing, crouching, or running on narrow, slippery, or erratically moving surfaces; or maintaining body equilibrium when performing gymnastic feats.

3. STOOPING, KNEELING, CROUCHING, AND/OR CRAWLING:

Stooping: Bending the body downward and forward by bending the spine at the waist.

Kneeling: Bending the legs at the knees to come to rest on the knee or knees.

Crouching: Bending the body downward and forward by bending the legs and spine.

Crawling: Moving about on the hands and knees or hands and feet.

4. REACHING, HANDLING, FINGERING, AND/OR FEELING:

Reaching: Extending the hands and arms in any direction.

Handling: Seizing, holding, grasping, turning, or otherwise working with the hand or hands (fingering not involved).

Fingering: Picking, pinching, or otherwise working with the fingers primarily (rather than with the whole hand or arm as in handling).

Feeling: Perceiving such attributes of objects and materials as size, shape, temperature, or texture, by means of receptors in the skin, particularly those of the finger tips.

5. TALKING AND/OR HEARING:

Talking: Expressing or exchanging ideas by means of the spoken word.

Hearing: Perceiving the nature of sounds by the ear.

6. SEEING: Obtaining impressions through the eyes of the shape, size, distance, motion, color, or other characteristics of objects. The major visual functions are: acuity, far and near, depth perception, field of vision, accommodation, and color vision. The functions are defined as follows:

Acuity, far: Clarity of vision at 20 feet or more.

Acuity, near: Clarity of vision at 20 inches or less.

Depth perception: Three-dimensional vision. The ability to judge distance and space relationships so as to see objects where and as they actually are.

Field of vision: The area that can be seen up and down or to the right or left while the eyes are fixed on a given point.

Accommodation: Adjustment of the lens of the eye to bring an object into sharp focus. This item is especially important when doing near-point work at varying distances from the eye.

Color vision: The ability to identify and distinguish colors.

Environmental Conditions

Environmental conditions are the physical surroundings of a worker in a specific job.

1. WORK LOCATION:

Inside: Protection from weather conditions but not necessarily from temperature changes.

Outside: No effective protection from weather.

Both: Inside and outside.

A job is considered "inside" if the worker spends approximately 75 percent or more of his time inside, and "outside" if he spends approximately 75 percent or more of his time outside. A job is considered "both" if the activities occur inside or outside in approximately equal amounts.

2. EXTREMES OF COLD PLUS TEMPERATURE CHANGES:

Extremes of cold: Temperature sufficiently low to cause marked bodily discomfort unless the worker is provided with exceptional protection.

Temperature changes: Variations in temperature which are sufficiently marked and abrupt to cause noticeable bodily reactions.

3. EXTREMES OF HEAT PLUS TEMPERATURE CHANGES:

Extremes of heat: Temperature sufficiently high to cause marked bodily discomfort unless the worker is provided with exceptional protection.

Temperature changes: Variations in temperature which are sufficiently marked and abrupt to cause noticeable bodily reactions.

4. WET AND HUMID:

Wet: Contact with water or other liquids.

Humid: Atmospheric condition with moisture content sufficiently high to cause marked bodily discomfort.

5. NOISE AND VIBRATION: Sufficient noise, either constant or intermittent, to cause marked distraction or possible injury to the sense of hearing and/or sufficient vibration (production of an oscillating movement or strain on the body or its extremities from repeated motion or shock) to cause bodily harm if endured day after day.

6. HAZARDS: Situations in which the individual is exposed to the definite risk of bodily injury.

7. FUMES, ODORS, TOXIC CONDITIONS, DUST, AND POOR VENTILATION:

Fumes: Smoky or vaporous exhalations, usually odorous, thrown off as the result of combustion or chemical reaction.

Odors: Noxious smells, either toxic or nontoxic.

Toxic conditions: Exposure to toxic dust, fumes, gases, vapors, mists, or liquids which cause general or localized disabling conditions as a result of inhalation or action on the skin.

Dust: Air filled with small particles of any kind, such as textile dust, flour, wood, leather, feathers, etc., and inorganic dust, including silica and asbestos, which make the workplace unpleasant or are the source of occupational diseases.

Poor ventilation: Insufficient movement of air causing a feeling of suffocation; or exposure to drafts.

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